STEEL

The

Metalworking Weekly

DECEMBER 19, 1960

A PENTON PUBLICATION

EDP Sales Hit $1 Billion Mark

Electronic data processing equipment makers will pass a new milestone this year—sales will top $1 billion as industry finds new uses for the lightninglike speeds of EDP. Walter W Finke, president, Electronic Data Processing Div., Minneapolis-Honeywell Regulator Co., sees the industry's sales rising to $3 billion or more by 1965.

Since most EDP equipment makers buy a large percentage of their components, that means a huge and growing market for highly specialized components. It widens marketing doors too for such everyday items as wire, power supply equipment, hardware, and even production equipment. See Page 76.

Gold Flow Problem—Metalworkers Ponder Effect on Overseas Business

Ceramic Platens Offer Advantages In Brazing Complex Configurations

Wire Brushes Tackle Metal Removal

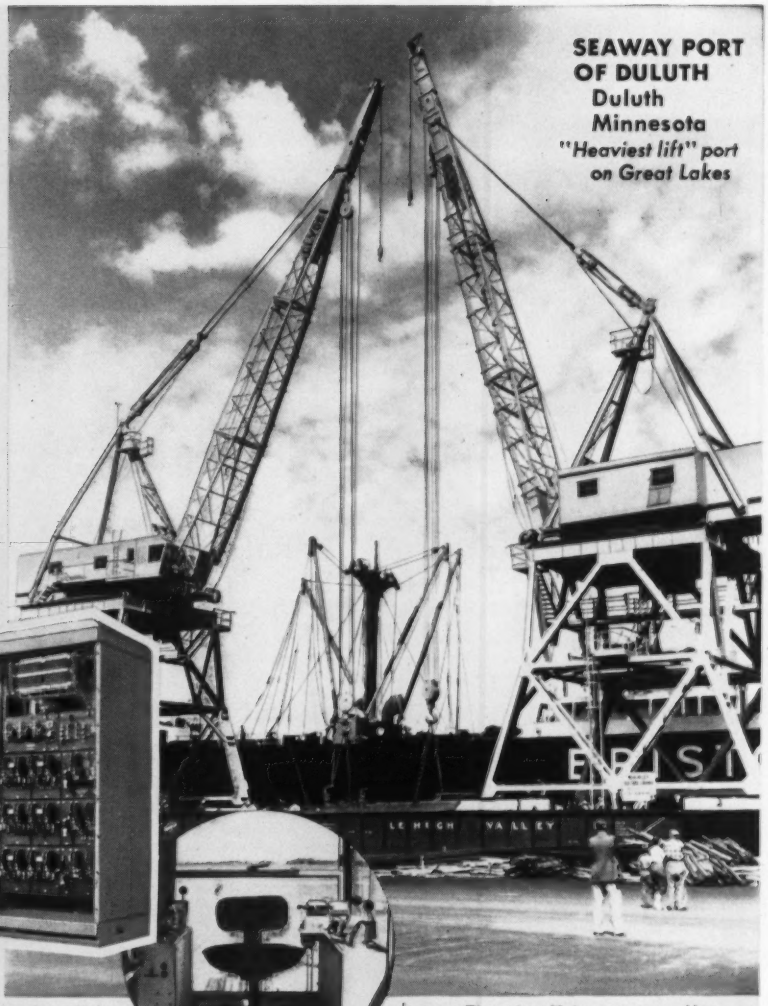
MATERIALS EFFICIENCY

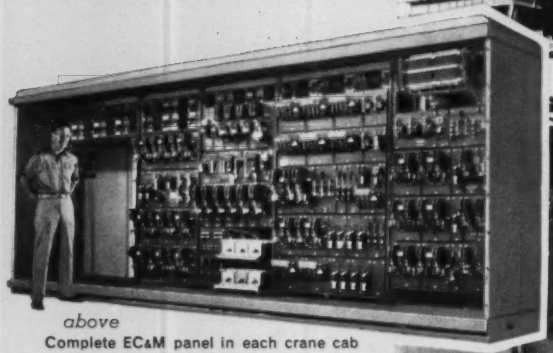
Management Gets It

No. 26 in STEEL's Program for Management

CONTENTS—TURN PAGE

DC PERFORMANCE with AC POWER on these Clyde Cranes





above
Complete EC&M panel in each crane cab provides control of boom hoist, main hoist, quadruplex travel, swing and magnets

at right • View of cab shows VM master switches grouped for operator convenience. EC&M control gives pin-point accuracy required for operation of both cranes in tandem

above • These two 90-ton cranes working in tandem can lift 180 tons, provide the only facility on the Great Lakes capable of handling such a load. The load shown is a 125-ton steel casting

EC&M "HWR" CONTROL does it safer, simpler

EC&M's HWR Controllers provide AC cranes with all the advantages of DC hoist control. Smaller hoist motors can be used than in equivalent AC systems. Moreover, HWR control, with its series motor and brake, provides the simplest and safest operation.

Highly efficient silicon rectifiers (self-contained in the controller) furnish the DC power. Exclusive WRIGHT dynamic lowering circuit combines high-speed handling with accuracy in spotting any load.

HWR controllers are easy to install. On EOT cranes, only four power collectors are needed. Circuitry is simple and the controller is easy to inspect. If you would like DC performance with AC power, check into EC&M's HWR controller.

Get the complete story on HWR controllers. *Your Square D Field Engineer can give you the facts, or write Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio*

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

wherever electricity is distributed and controlled

4175

This Week in STEEL The Metalworking Weekly

December 19, 1960 Vol. 147 No. 25

Gold Flow Action: What Impact on Overseas Business?

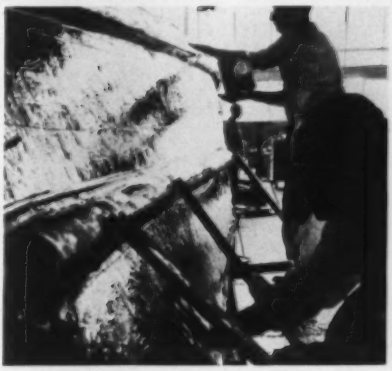
When the Treasury Department asked Ford to modify its purchase of its British subsidiary, metalworkers raised an eyebrow. Does this signal a movement to limit overseas investment by U. S. firms? Other recent actions haven't helped foreign public relations either, they charge. It could affect overseas operations. Metalworkers offer suggestions on what should be done.
PAGE 71

Materials Efficiency—Management Gets It

How can materials efficiency potential be achieved? Three related approaches are needed, say the experts: 1. Better organization of the materials function. 2. Higher buying standards. 3. More skillful purchasing.
PAGE 81

New Jobs Sought for Brazing Platens

Conventional industry will find unitized tooling and ceramic brazing elements advantageous where it must braze or perform similar functions on short production runs, says Avco Corp.'s Nashville, Tenn., Div. It believes the process could be applied to other types of manufacture as well. Avco developed the process to cut costs in making stainless steel honeycomb panels for XB-70s. In the photo, a permanent coating is being put on the surface of a master mold.
PAGE 106



Wire Wheel Upgraded to Metal Removal Role

Need something between a grinding wheel and conventional wire brush for surface preparation and finishing? Tell Osborn Mfg. Co., Cleveland. It has come up with a new type of brush that can remove as much as 0.0005 in. of mild steel in one pass. It also has been field tested in a number of other applications. The company hopes the development will lead to design of equipment for a wider variety of jobs.
PAGE 120

Bismuth Gets Thermoelectric Boost

Bismuth is getting more attention than at any previous time in its 200 year history. Reason: The relatively new science of thermoelectrics. A bismuth-tellurium (50-50) alloy is the best material known today for thermoelectric cooling. Tellurium usage is expected to double to more than 700,000 lb yearly by the late '60s, so bismuth usage can be expected to keep pace. Also, bismuth can be expected to find almost as lucrative a market as a catalyst in plastics production.
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Bethlehem circular forgings are available in carbon, alloy, and stainless steels, and some heat-resistant grades. 10 to 48-in. OD. 100 to 2,000 lb. As-rolled or rough-machined to specifications.

Which cost less, castings or circular forgings?

In initial cost, a Bethlehem circular-forged blank is competitive with a cast blank.

But that's where the competition ends.

Due to the hot working of the metal (our unique Slick Mill forges and rolls a circular product in one operation in one minute), forgings have better physical properties, greater strength than castings.

HIGHER CUTTING SPEEDS—The uniform quality of Bethlehem circular forgings allows you to use higher cutting speeds. Machining time—both in roughing, and in hobbing teeth—is cut; tool life is increased. And there's no chance of sand damaging valuable hobbing tools.

LESS METAL—You'll find, in many cases, weight can be reduced. The greater strength of a *forged* circular product permits thinner rim sections without sacrificing strength.

Our sales engineers will be happy to give you the whole story on Bethlehem circular forgings—competitive initial cost, sure machining savings, possible weight savings, a better-quality product all around.

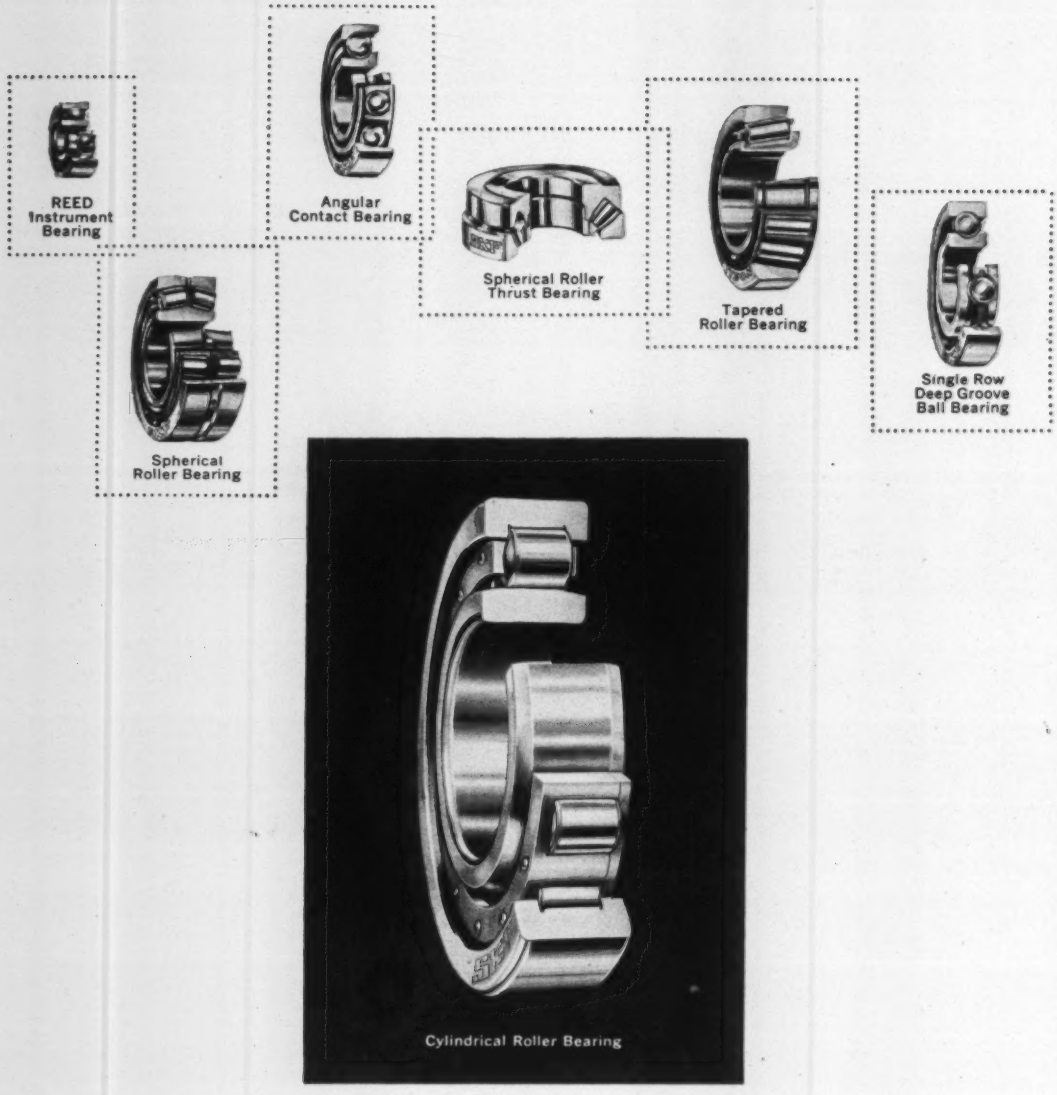
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Sales: Bethlehem Steel Export Corporation

Steel *for Strength . . . Economy . . . Versatility*

BETHLEHEM STEEL

BETHLEHEM STEEL

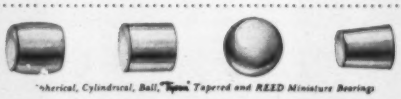


What's a "special size" in production bearings?

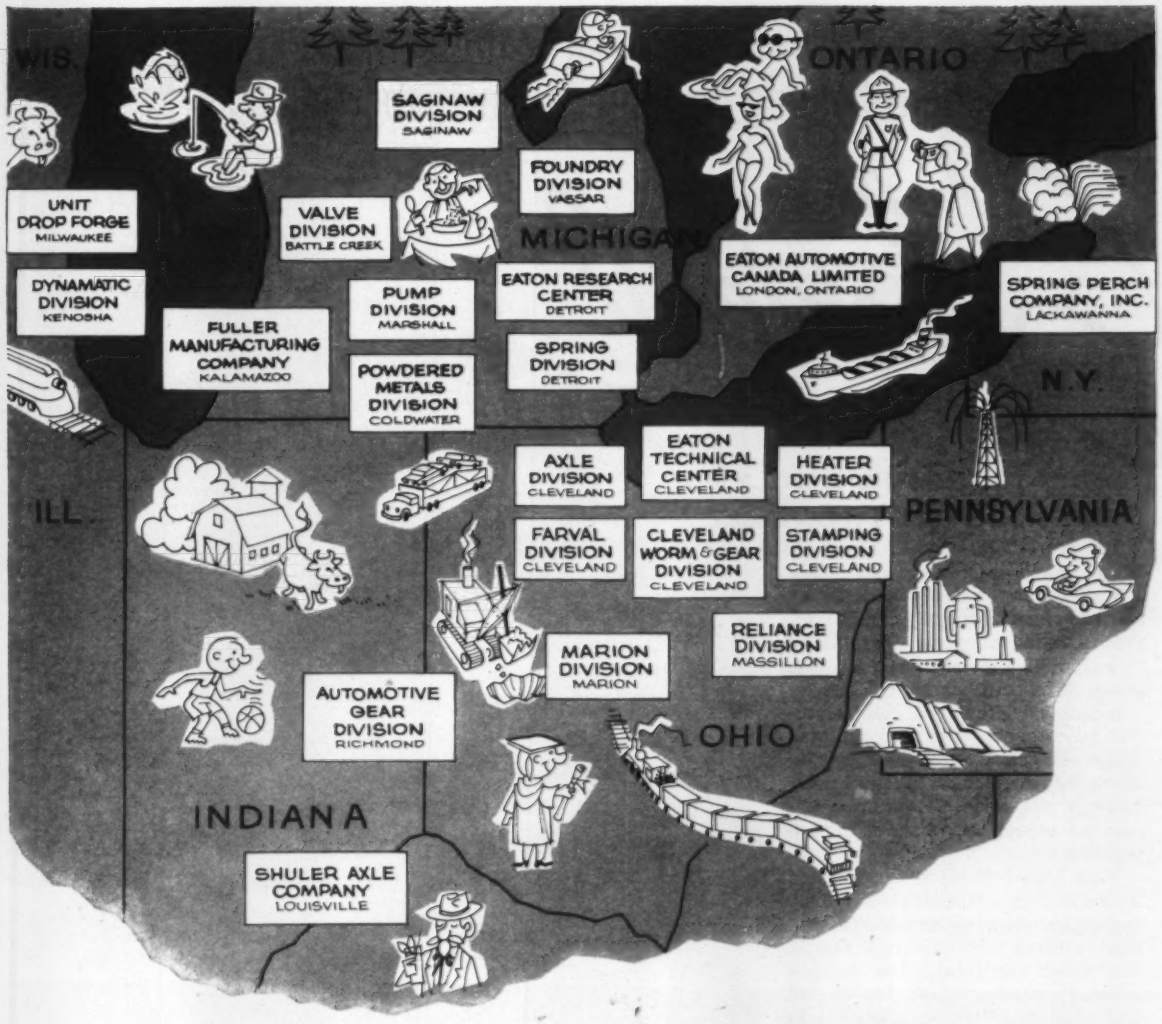
SKF makes so many standard sizes, there's practically no such thing as a "special size" of bearing. They range from tiny instrument bearings right up to four-row tapered roller bearings—and account for almost every possible bore size in-between.

Take SKF's standard cylindrical roller bearing, for example. It's promptly available in 154 sizes of single- and double-row types—for shaft diameters ranging from 1" to 9.5". Every size, in both types, offers high radial capacity in relation to its size and operates at highest speeds because of its very low friction.

So, before you specify a "special size" bearing, call the nearest SKF sales office first. The odds are better than 1,000 to 1 that there's already a standard SKF bearing of exactly the size you need. 6007



EVERY TYPE—EVERY USE
SKF
SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.



Why this Map?

It has a big story to tell—locating 20 of the 23 Eaton Divisions and Subsidiaries where more than 12,000 Eaton people are doing important things to add to the quality, dependability, and long life of the country's best known and most distinguished manufactured products in every field. Not shown are two Eaton Subsidiaries in Brazil.

Our manufacturing operations supply parts and assemblies to leading companies in widely diversified industries. Our two Research and Technical Centers, also shown on this map, work in close co-operation with all of our Divisions; their imaginative engineering continually improves materials, product design, and manufacturing processes. These groups are doing some deep-secret planning, too, which will make our customers' future products even better than today's.

If you would like to know more about Eaton plants and products—send for your copy of our new illustrated booklet.

EATON MANUFACTURING COMPANY

General Offices: Cleveland 10, Ohio

THERE ARE TWENTY-THREE EATON DIVISIONS AND SUBSIDIARIES, PLUS TWO RESEARCH AND DEVELOPMENT CENTERS, CONTRIBUTING CONTINUOUSLY TO INDUSTRIAL PROGRESS

News! The best features of
modern bearing design combined and refined in

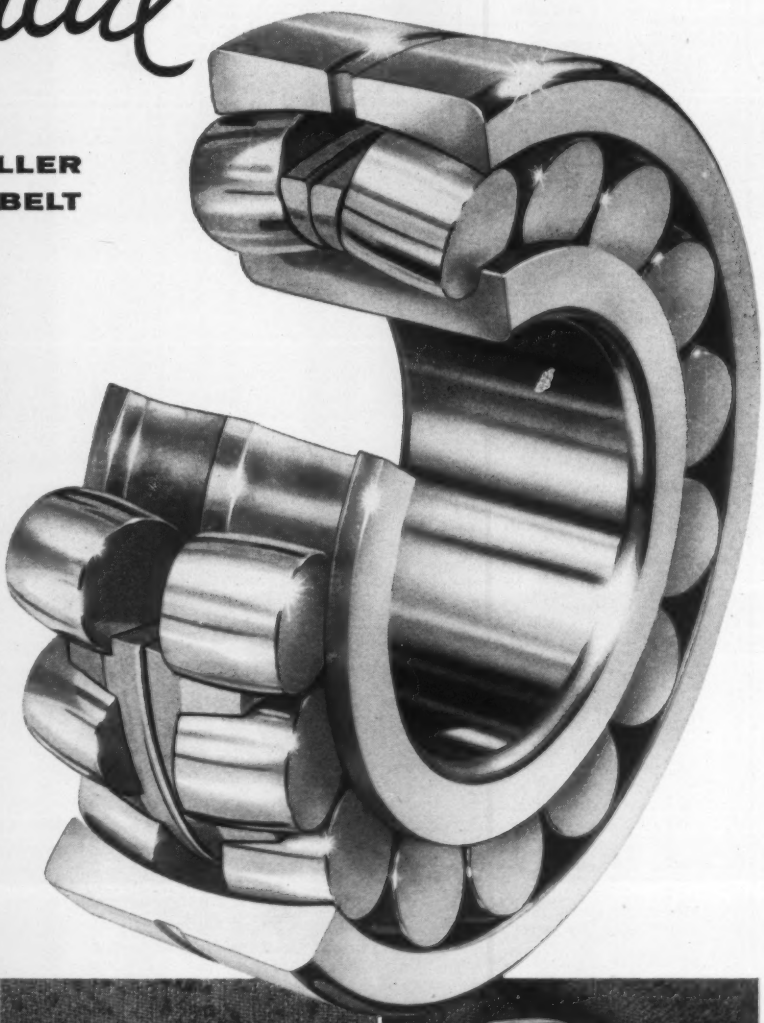
Spherical

SELF-ALIGNING ROLLER BEARINGS BY LINK-BELT

BIG, mirror-smooth convex rollers *plus* heavy, broad-shouldered inner race *plus* centrifugally-cast bronze, precision-machined retainers! Only from Link-Belt do you get ALL that is best in modern bearing design.

Individually, these elements represent major improvements on accepted design concepts. Collectively, they constitute the most efficient spherical roller bearings available . . . promise unequalled economies, whatever the application.

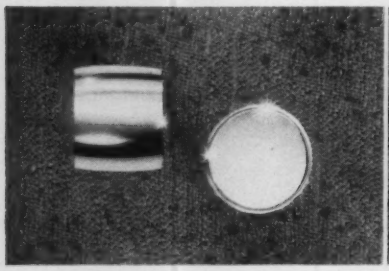
Your Link-Belt office or authorized stock-carrying distributor will gladly explain the many performance advantages evolved with this new design. And either can furnish full data on industry's most complete line of ball and roller bearings . . . pillow blocks and flanged, flanged-cartridge, cartridge and take-up blocks.



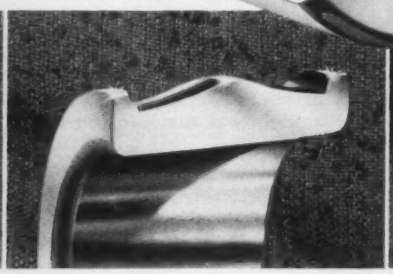
LINK-BELT

MANUFACTURERS OF SELF-ALIGNING BALL AND ROLLER BEARINGS

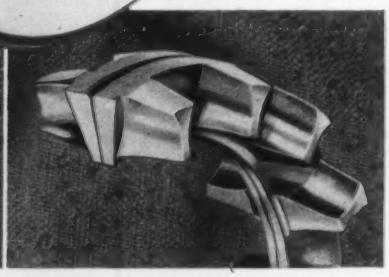
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. Plants, Sales Offices and Distributors in All Principal Cities. 14,819



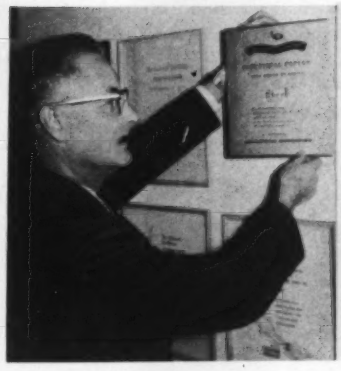
BIG, HIGHEST-CAPACITY ROLLERS. Each bearing has a maximum number of rollers —as large as possible, yet all components are in optimum balance.



HIGH, HEAVY INNER RACE FLANGES present convenient hold for assembly and removal of bearing without cutting away shaft, avoid any need to skimp on shaft shoulders.



PRECISION-MACHINED, CENTRIFUGALLY-CAST BRONZE RETAINERS have many times more support and ability to withstand high stress. They are not stampings. Design assures maximum bearing efficiency.



Hall Of Fame

How many times have you heard this phrase: "If only the walls could talk"? One of the walls in STEEL's editorial offices could spin quite a yarn. It features awards won in *Industrial Marketing* magazine's editorial competitions.

Here's Editor Walt Campbell hanging the newest award, No. 29, in STEEL's own hall of fame. The certificate of merit was presented last month for the 13 articles in our Production Efficiency series (the first of our 1960 Program for Management). The contest: *IM*'s 22nd annual Business Paper Editorial Achievement Competition. The category: Outstanding series in industrial publications.

In the competition, 703 entries were submitted by 290 publications. STEEL was one of 46 magazines (12 industrial) to receive awards.

A brief word about No. 29: It gives STEEL more awards than any other industrial publication and more than double the number earned by any other metalworking publication.

Companion Piece

The second half of our 1960 Program for Management, the Materials Efficiency series, is concluded in this issue. Be sure to check the editors' wrap-up.

Attention Advertising Managers

With all the hullabaloo over windy claims in consumer advertising, we felt a little disappointed when we didn't hear something about industrial advertising. (*Oh yeah?*) Our yearnings are finally satisfied. We got a blast, light style, from a Pennsylvania reader:

". . . A safety suggestion to advertising staff(s) might be in order," writes R. C. Jordan, field service engineer, New Jersey Branch (West Caldwell), Crucible Steel Co. of America. "The advertisement on Page 37 of the Nov. 21 issue shows an operator with his face much too close to a bending operation. Coiling springs without the protection of safety glasses seems foolhardy. The writer obtains the same reaction to the ad on Page 42 . . . in the Roebling ad on Page 113, the operator is unquestionably wearing safety glasses.

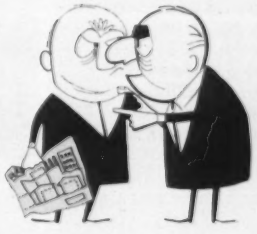
". . . Professional models hesitate to wear safety equipment, but it is becoming standard practice . . . in most metalworking operations."

Good suggestion, say we. Besides the educational benefits, some of the new safety equipment might add touches of glamour to illustrations.

Extreme Care

We know a harried husband who finally became fed up with his wife's everlasting shifting of furniture. Shins bruised on tables, and lamps on the wrong sides of favorite chairs seemed to be his lot.

When the family decided to build a new home, the architect prepared scale models of the furniture and the new floor plan. The aggrieved husband then handed the package to his wife, saying: "Now find *the* arrangement you want, because the furniture will be bolted to the floor!"



That treatment may sound a trifle harsh, but just imagine what companies get into when expanding or modernizing industrial facilities. Moves sound fairly simple until the internal hassles begin. Next week, New York Resident Editor Brian Wilson will tell you how to plan for that new plant. He has done a lot of legwork to find out how you can get the job done with the fewest headaches and the maximum value for dollars spent.

The Story Behind a Story

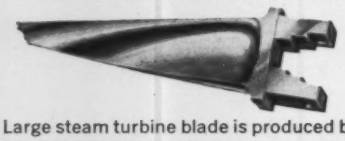
In next week's Foreign Communique, you'll find a news item about plans for India's first continuous casting steel plant. We learned about the $1.2 million facility through Pittsburgh Resident Editor Bill Wallace's interview with V. S. Kudva, the man behind the project. He's technical director, Canara Workshops Ltd.

During a recent visit to Pittsburgh's Mellon Institute, Mr. Kudva told Bill: "I got the idea of

TIME SAVINGS!

Here's how Ex-Cell-O's Numera-Trol system of tape-controlled precision machine tools cuts costs for three modern manufacturers . . .

Precision Contouring Machine, controllable to .000025", saves 112 hours lead time, 54 hours grinding time in production of this templet.



Large steam turbine blade is produced by Precision Profiling Machine. Lead time saved, 120 hours; machining time saved, 78 hours.

Fuel control cam, produced by Precision Cam-Milling Machine, goes from performance curve to machined part in just 47.5 hours. Former method took 230 hours.

How many hours can Ex-Cell-O Numera-Trol save for you? For a prompt answer, see your Ex-Cell-O Representative, or call or write direct—and be sure to ask for your free copy of "A Guidebook to Numerically Controlled Machine Tools."

NUMERA-TROL (XLO)

PRODUCED BY

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN 60-58

EX-CELL-O FOR PRECISION

making alloy steels by continuous casting from a STEEL article. When I read the piece, 'Continuous Casting Comes to Carbon Steel' (Mar. 25, 1957, pp. 108-114), I decided to find out whether the process could be adapted to our requirements. It looked promising—a way to make small quantities of specialty steel without a huge capital investment . . ."

The rest of the story will be on the Foreign Communique page. We're thinking about framing it.

Looking Back to Get Ahead

Among the many prescriptions for everyday living offered by baseball's Satchel Paige was: "Don't look back. Whatever's chasing you might be catching up."

Counter to Satch's advice, a look back may pay. We refer to the November and December issues of STEEL. The deadline for entries in our November Usership Idea of the Month Contest is Jan. 1, 1961. About the December contest, read how . . .

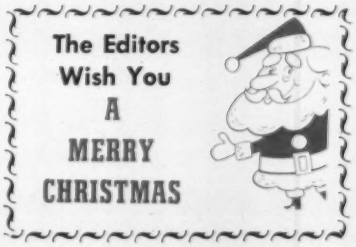
You Can Win $1000 This Month . . .

. . . in STEEL's Usership Idea of the Month Contest. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—December, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If in the opinion of the judges, yours is the best idea submitted—**you will win $500.**

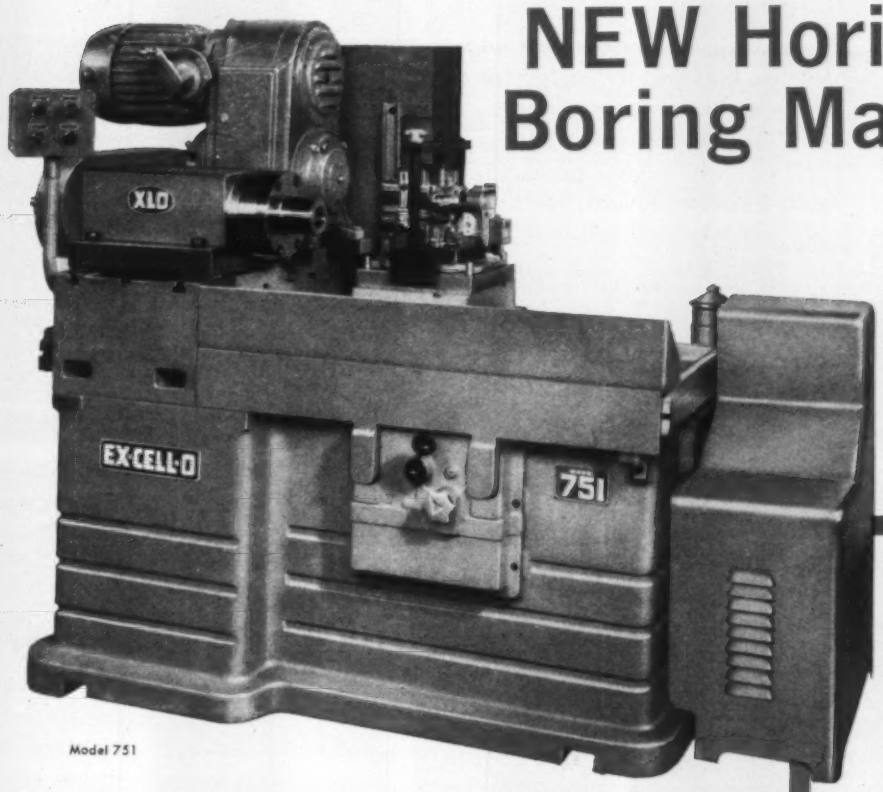
There's more . . . you will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

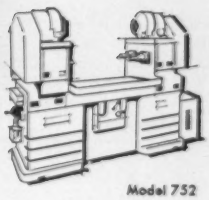
You can enter as many times as you wish. Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. **Deadline for this month's contest is Feb. 1, 1961.**



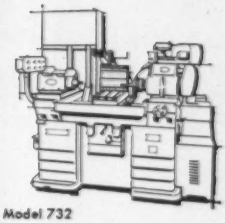
EX-CELL-O ANNOUNCES...
NEW Horizontal Boring Machines



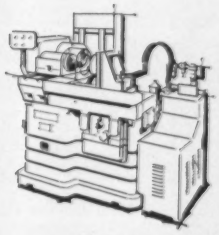
Model 751



Model 752



Model 732



Model 731

Designed and built for maximum dimensional stability under all operating conditions, these new hydraulically operated precision boring machines offer the ultimate in accurate repeatability.

Check these features for production efficiency . . .

- Temperature controlled hydraulic panels
- Extreme rigidity and stability in bases and tables
- Hydraulic and coolant system externally mounted
- Ex-Cell-O standard and tapered roller bearing spindles
- Designed for close-tolerance precision boring, turning, facing, counterboring, chamfering, grooving, recessing and trepanning operations.
- May be operated either manually or automatically.
- Engineered for simple installation into automated production lines.

Contact your Ex-Cell-O Representative or write direct for details.

60-66

EX-CELL-O FOR PRECISION

PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • TORQUE ACTUATORS • CONTOUR PROJECTORS • GAGES AND GAGING EQUIPMENT • GRANITE SURFACE PLATES • COMPUTER PRODUCTS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • ATOMIC ENERGY EQUIPMENT • DAIRY AND OTHER PACKAGING EQUIPMENT

Machinery Division

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

GAYLORD DIGS DEEP
INTO PACKAGING PROBLEMS

Excavation marks the spot where packaging problems exist — because Gaylord is digging for solutions, with a determined crew of researchers and developers. The more Gaylord solutions, the fewer problems for you.

Find out where your packaging profit is buried. Call your nearby Gaylord Man. He knows containers — in depth.

CROWN ZELLERBACH CORPORATION
GAYLORD CONTAINER DIVISION

Gaylord Boxes

IN CANADA • CROWN ZELLERBACH CANADA, LTD. VANCOUVER, B. C.

HEADQUARTERS, ST. LOUIS
PLANTS COAST TO COAST

SUN QUENCHING OILS

Keep coolers cleaner longer . . . combine quality with economy

1 Get Low Operating Cost From Natural Detergency

Sun Quenching Oil Light is a naphthenic quenching oil with a natural detergency that keeps coolers clean. One large auto manufacturer reported a cost drop of over 90% in cooler maintenance after switching to Sun Quenching Oil Light.

2 Get Maximum Physicals In Your Steel

Sunquench 1070 is particularly important in fast-quenching operations because it cools at the optimum rate during the critical stage, minimizes distortion, deepens hardness. With Sunquench 1070, you may be able to substitute lower alloy steels for more expensive grades. Exceptional thermal stability of Sunquench 1070 means long life.

3 Get Brighter Parts

Sun Quenching Oil 11 is a premium-quality paraffinic quenching oil designed for work requiring an oil with a high flash point. It is particularly good for bright quenching. Its high thermal stability prevents decomposition and the resultant streaks on bright-quenched parts.

4 Get Longer Marquench Oil Life

Sun Marquenching Oils are dewaxed paraffinic oils made for controlled martempering at temperatures as high as 400 F High flash and fire points keep Sun Marquenching Oils safe. High oxidation-resistance increases their useful life in your quench tank.

TALK QUENCHING with the Sun man. He'll show you how one or more of these Sun Quenching Oils can handle all of your needs. Or write to Dept. S-12.

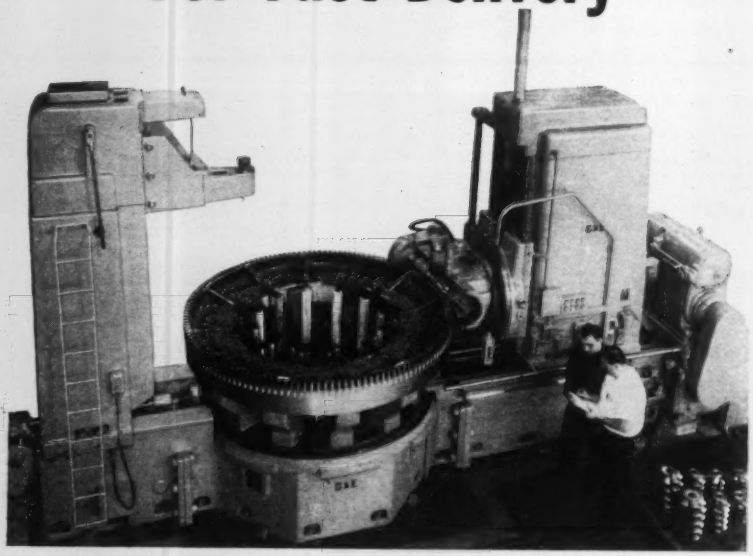
INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILA. 3, PA.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

New Production Capacity For Fast Delivery



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CALENDAR OF MEETINGS

Jan. 9-11, Twenty-second Annual Mining Symposium: Norshor Theater, Duluth; headquarters at Hotel Duluth. Sponsored by University of Minnesota in co-operation with Minnesota Chapter of AIME&ME. Information: University of Minnesota, Center for Continuation Study, Minneapolis 14, Minn.

Jan. 9-13, Society of Automotive Engineers Inc.: International congress and exposition, Cobo Hall, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Jan. 10, Hoist Manufacturers Association: Annual meeting, Statler-Hilton Hotel, Cleveland. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: J. H. Peritz.

Jan. 17-19, Instrument Society of America: Winter instrument-automation conference and exhibit, Sheraton-Jefferson Hotel and Kiel Auditorium, St. Louis. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

Jan. 18, Steel Plate Fabricators Association: Annual meeting, Lago Mar Hotel, Ft. Lauderdale, Fla. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

Jan. 18, Metallurgical Society of AIME: Third AIME mechanical working conference, Penn-Sheraton Hotel, Pittsburgh. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Jan. 19, Engineers Joint Council: Annual meeting, Biltmore Hotel, New York. Council's address: 29 W. 39th St., New York 18, N. Y. Secretary: L. K. Wheelock.

Jan. 19-21, Southern Industrial Distributors: Midyear meeting, Palm Beach Biltmore Hotel, Palm Beach, Fla. Association's address: 1626 Fulton National Bank Bldg., Atlanta 3, Ga. Secretary-treasurer: E. L. Pugh.

Jan. 23-24, Industrial Heating Equipment Association Inc.: Winter meeting, Dearborn Inn, Dearborn, Mich. Association's address: Association Bldg., Washington 6, D. C. Executive vice president: Robert E. Fleming.

Jan. 23-26, Plant Maintenance Show: International Amphitheatre. Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 30-Feb. 3, American Society for Testing Materials: Committee week, Netherland-Hilton Hotel, Cincinnati. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Thomas A. Marshall Jr.

Jan. 31, Steel Kitchen Cabinet Manufacturers Association: Annual meeting, Sheraton Towers Hotel, Chicago. Association's address: 910 Park Bldg., Cleveland 14, Ohio. Executive secretary: Sandford Curtiss.

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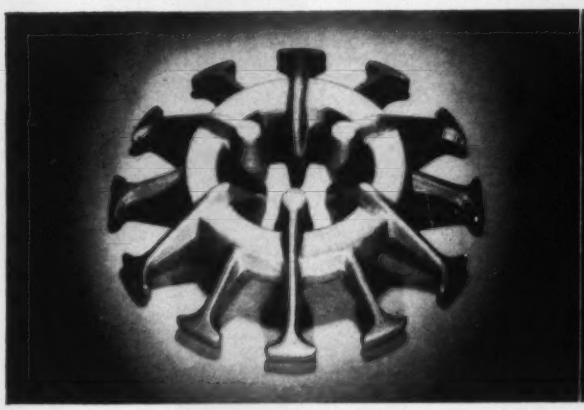

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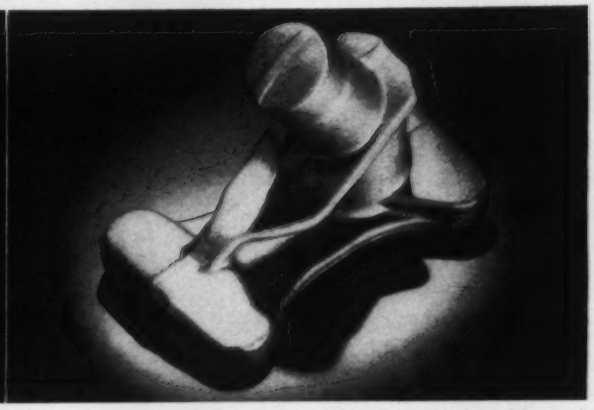

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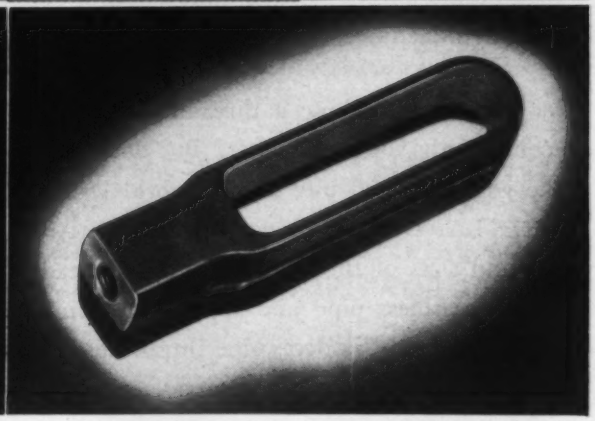

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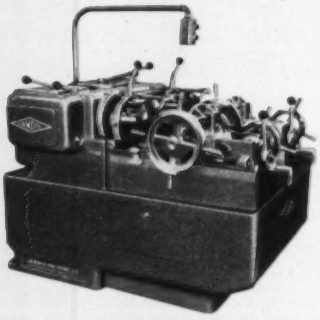

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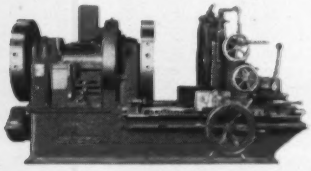

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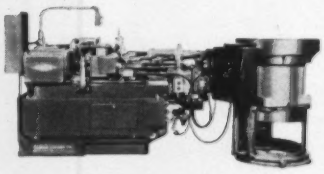

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AGAIN-

Revere helps "fit the metal to the job"

AND A COMMUTATOR MANUFACTURER SAVES ON BOTH MATERIAL COSTS AND OVERALL COSTS WHILE PRODUCING A SUPERIOR PRODUCT

The hub of the small commutator you see above originally was made of a ferrous metal. Certain problems cropped up due to the fact that the rod from which the hubs were fabricated, not only had to be drilled, but it also had to be able to withstand a flanging operation. The engineering department of Dayton Precision Manufacturing Company called in one of Revere's Technical Advisors for consultation.

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And there you have another example of how Revere in collaboration with the manufacturer helped, "fit the metal to the job," which resulted in a better part at the least possible cost. Why don't you take advantage of this kind of service?

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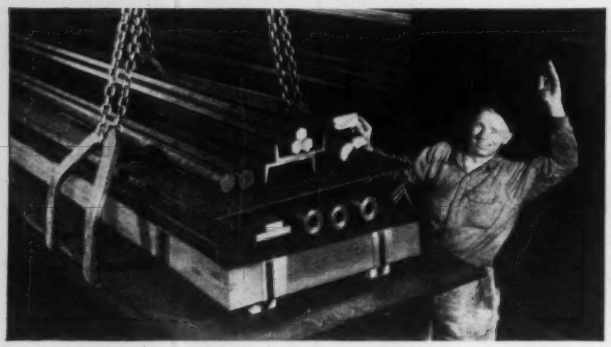

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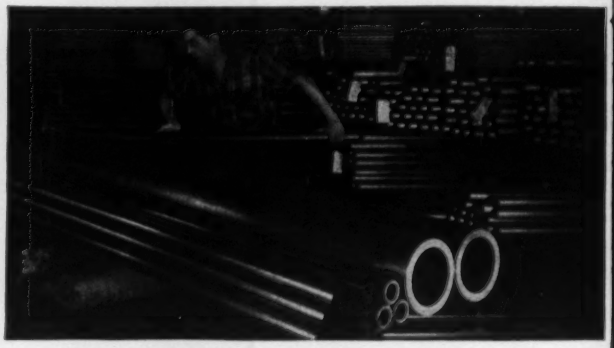
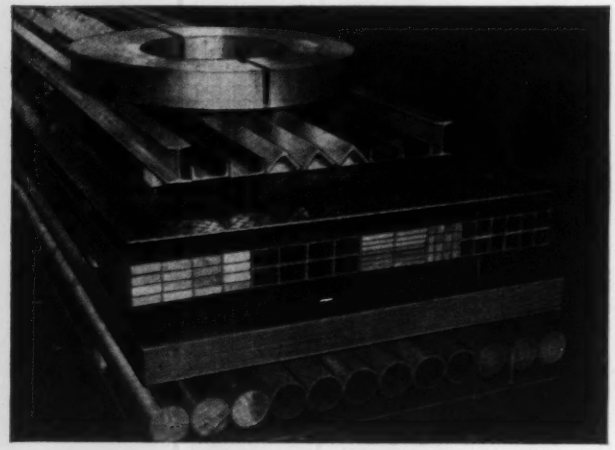


TUBING AND COLD FINISHED BARS—Here again, Ryerson stocks are by far the nation's largest—including seamless and welded mechanical tubing; hydraulic cylinder and fluid line tubing; structural tubing; new Ledloy® 170 tubing, etc. And in cold finished bars—shafting, machinery steel, accuracy stock and screw stock, including fast-machining Ledloy 375 & 300.



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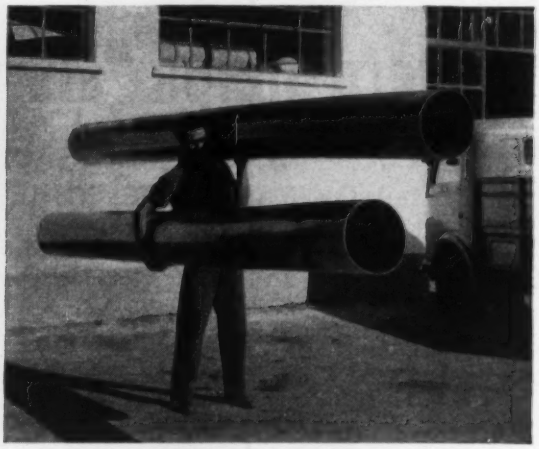

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Space	Material handling	Insurance
Equipment	Cutting & burning	Taxes
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Combination 46- x 114-inch Blooming-Slabbing Mill and 38- x 53- x 122-inch 4 high Plate Mill at the Sault Ste. Marie works of The Algoma Steel Corporation.

how PARISH CUT COSTS, saved time for another manufacturer

problem: A big user of wire cable needed wire reels requiring close parallel tolerances between heads in large quantities, at low cost—and fast!

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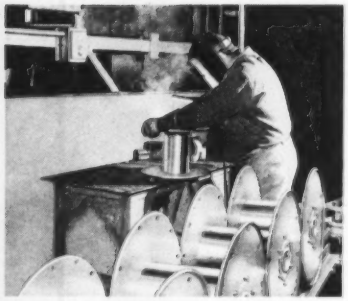
Perhaps Parish can help you • Write or telephone next time you have a parts production problem.



Bolts were welded to heads of wire reels to prevent back-out when reel is in high-speed operation. Main illustration shows how each reel was carefully tested before being shipped.

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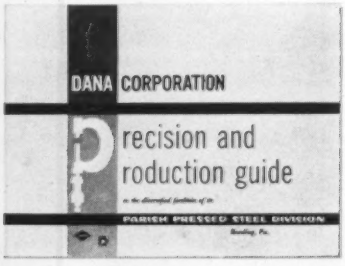

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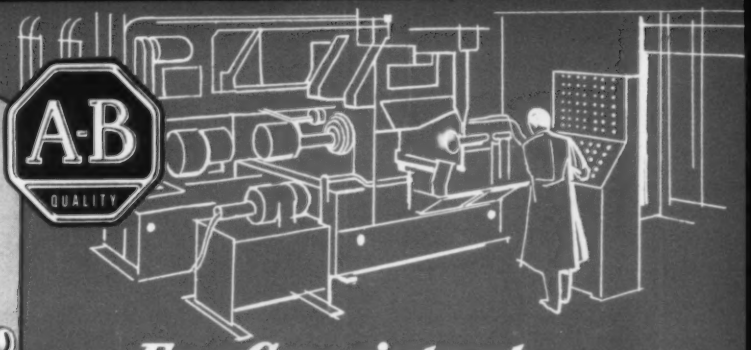

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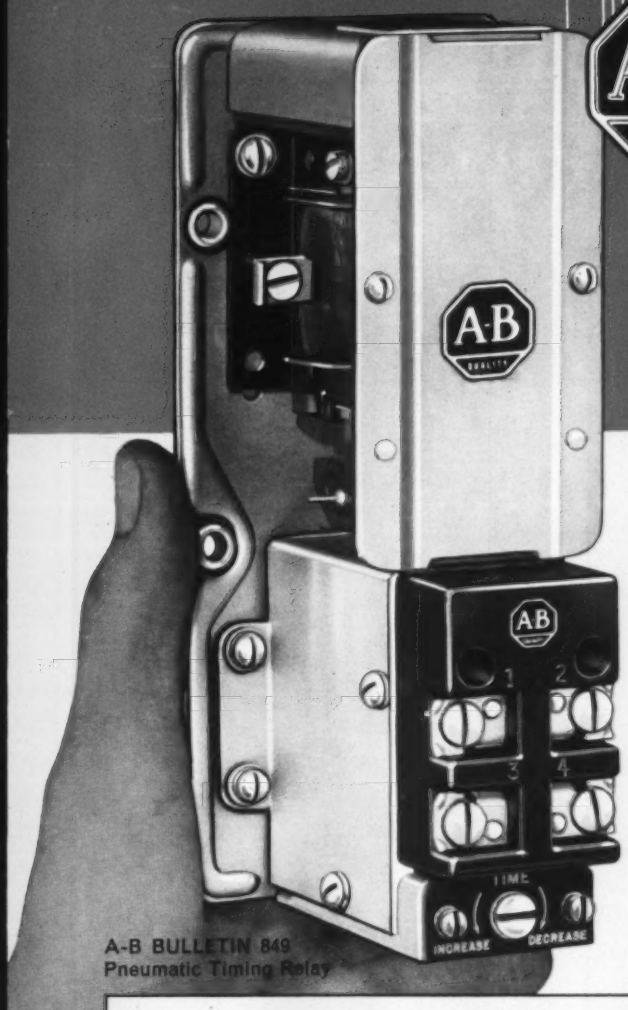

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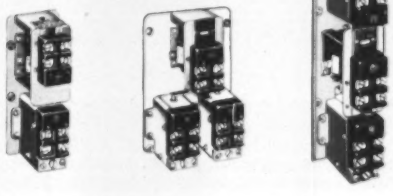
Specify

ALLEN-BRADLEY TIME DELAY RELAYS

For maximum production, high-speed automatic processes demand that the required operations "start" and "stop" at the correct instant, time after time—*without variation*. For consistent accuracy and trouble free operation, no timing relay on the market can equal the performance of A-B Bulletin 849 pneumatic timers. The delay period can be varied from 1/20 of a second to 3 minutes, and the setting will hold with an accuracy of ± 10%. Conversion from ON-DELAY to OFF-DELAY (or vice versa) is simple—no adjustment is necessary. Like *all* A-B control, these quality timers have maintenance free, double break, silver contacts. The two sets of contacts—one N.O. and one N.C.—are electrically independent, for greater control flexibility. Also, auxiliary contacts can be easily added.

To make certain of a completely satisfactory electrical installation, specify Allen-Bradley "quality motor control"—in addition to the Bulletin 849 pneumatic timing relays. Write for details, today.

A few of the varieties of A-B pneumatic timers



Single operation time delay relay

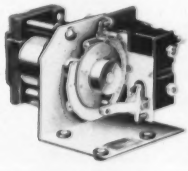
Dual operation time delay relay

Compound operation time delay relay

Allen-Bradley makes a broad line of timing relays to satisfy all automatic processes.

BULLETIN 848
Fluid Dashpot
Timing Relay

BULLETIN 852
Electronic
Timing Relay



BULLETIN 850
Motor Driven
Process Timer

30-60-RM

ALLEN-BRADLEY

Member of NEMA

Quality Motor Control

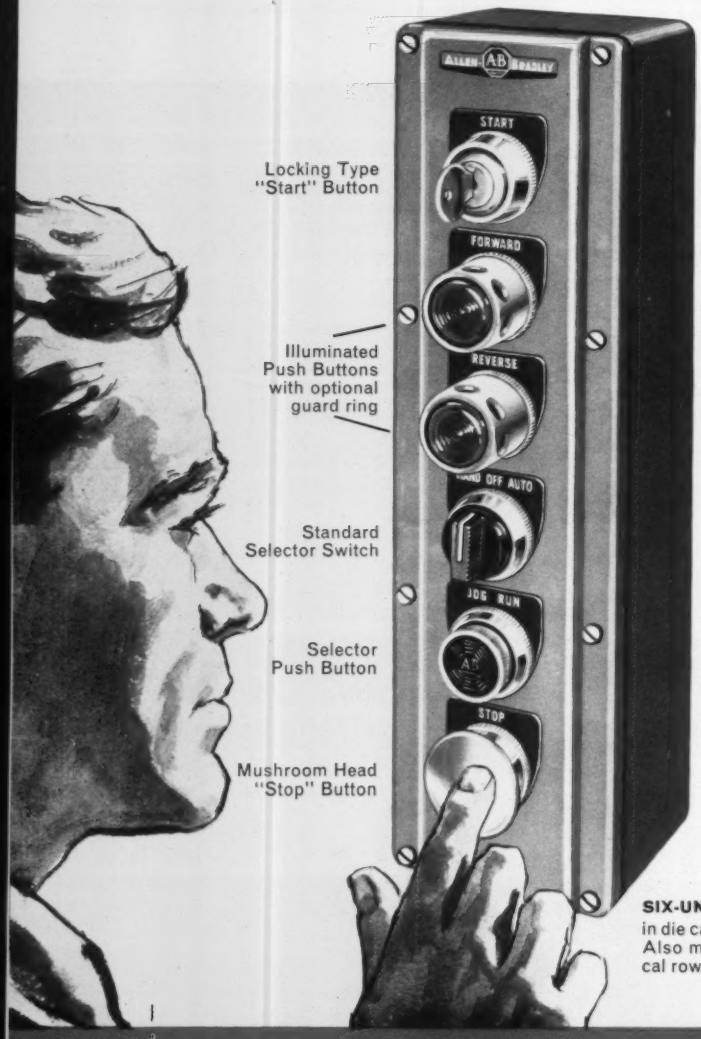
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ontario

BE SURE YOU GET

Quality Appearance
Quality Operation

Specify Allen-Bradley's line of ***OILTIGHT CONTROL STATIONS***

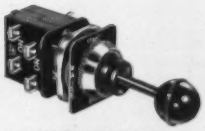
Allen-Bradley oiltight units and stations harmonize with the trim lines of modern machine tools —they look as if they were a part of the machine. Also, from the wide selection of control units, you'll be able to satisfy every operating requirement. A-B control units are positively oiltight—impossible for oils and cutting fluids to foul the contacts. And the silver contacts assure reliable operation. The rugged construction and generous wiring room of all A-B stations are valued by the installation engineer. Insist on Allen-Bradley pilot control units and stations—you can't make a mistake! Send for Publication 6090.



FLUSH HEAD
push button, also made with extended head.

WING LEVER PUSH BUTTON
Combines push button and selector switch.

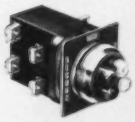
PUSH-TO-TEST PILOT LIGHT
Six different color lenses available.



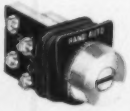
4-WAY SELECTOR SWITCH
Also furnished for 2-way operation.

PILOT LIGHT
Transformer or full voltage types.

DOUBLE CIRCUIT
Has 2 N.O. or 2 N.C. sets of contacts.



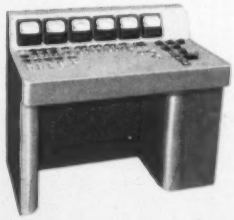
PILOT LIGHT CLUSTER
Four lights of different colors in one unit.



SELECTOR SWITCH
With coin slot operator. Other operators available.

CONVENIENCE RECEPTACLE
For plugging in work light or small tools.

SPECIAL CONTROL CONSOLES
can be furnished to meet your exact operating requirements.



SIX-UNIT CONTROL STATION
in die cast aluminum housing. Also made with up to 4 vertical rows with 4 units per row.

50-60-RM

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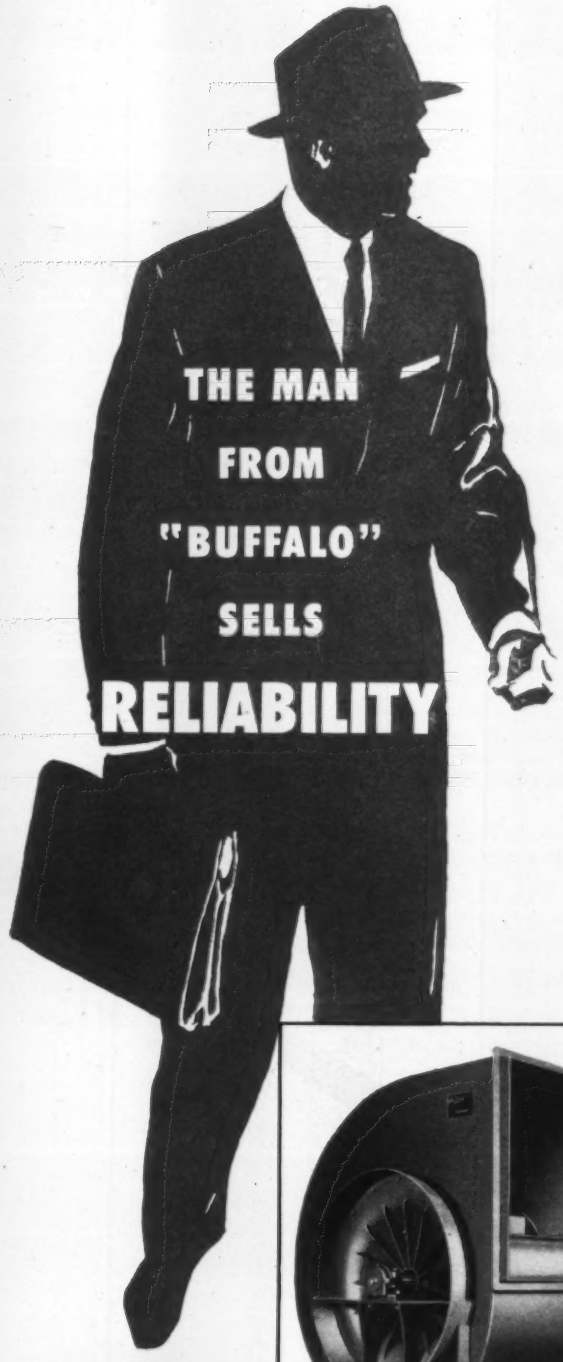
QUALITY MOTOR CONTROL



You Can Rely on the Air Handling Products He Sells . . . for effective, efficient and economical service because they are correctly designed and made of quality materials.

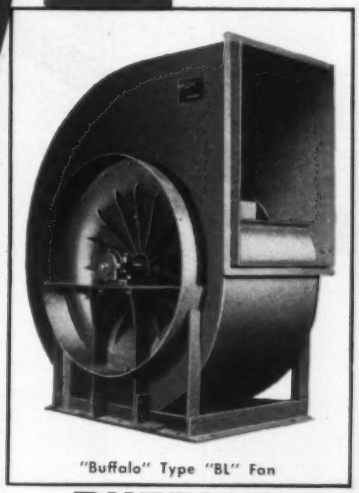
You Can Rely on the Services He Offers . . . because he is a specially trained engineer backed by over 83 years of fan engineering and production experience.

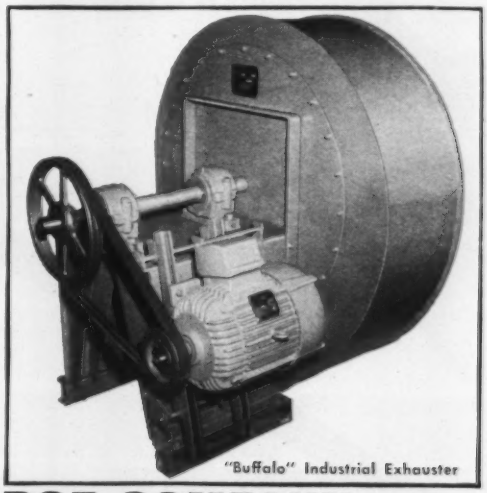
Note the quality features built into the two "Buffalo" Fans on this page. This is the kind of superior construction that insures complete reliability.

"Buffalo" Industrial Exhausters — the rugged construction of these efficient air and materials handling fans includes heavy steel plate housing, welded throughout. These units are widely used in steel mills, cement plants and similar severe applications. Models are available for moving hot gases from 200°F. to 850°F. In corrosive fume installations, "Buffalo" Rubber-Lined Exhausters outlast metal fans up to twelve to one. These units may be ordered with material wheels for efficiently moving abrasive dust, saw dust, chips, long shavings and a variety of other "problem" materials. For complete facts, write for Bulletin FI-110.

"Buffalo" Type "BL" Fans — These durable fans are designed for peak performance in all Class I and II air moving jobs. Ideal for ventilating, air conditioning and air cleaning systems. The heavy gauge housings are of all-welded construction. Structural steel bracing provides stiffness and rigid bearing support. Hot-rolled or forged shafts are precision made for perfect wheel and bearing fit. Husky backward-curved blades are welded to solid shroud and back-plate. Self-aligning anti-friction bearings assure continuous dependable operation at maximum tip speed. Write for Bulletin F-104.

Whatever your air handling needs, call in "The Man From Buffalo". . . your nearby "Buffalo" Engineering Representative. He'll help you be sure you have the right fan for the job. And when it's a "Buffalo" Fan, you can depend on its reliability.


"Buffalo" Type "BL" Fan


"Buffalo" Industrial Exhauster

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

A reindeer brings you Season's Greetings when you write to

SANTA CLAUS

(specialist in world peace)

A Field Engineer brings you profitable ideas when you write to *LINCOLN*

(specialists in arc welding)

WRITING to Santa Claus is an exciting experience for the whole family. Eager faces . . . pencilled lists . . . crackling fire . . . and the air alive with expectancy. And then the long, almost unending wait until Christmas, when miraculously St. Nick generally delivers even a little more than was desired. This is why we have faith in him. That's the spirit of Christmas!

Now, we don't say our Field Engineers will arrive in sleighs filled with toys, but this we can guarantee: if you write a letter to LINCOLN, the Field Engineer who calls will be able to give you a good deal more help than you expected. Not only does he know welding products but also the best procedure to use on each job. He understands how to relate welding profitably to your total manufacturing operation.

That's why so many companies who have had faith in LINCOLN for over fifty years say, "It's a good idea to do business with LINCOLN where arc welding is a specialty and cost reduction comes to you as a 'plus' at no charge."

Merry Christmas!

THE LINCOLN ELECTRIC COMPANY
Dept. 2960 • Cleveland 17, Ohio

LINCOLN WELDERS

REPUBLIC STEEL LOCKERS

...top Quality with Economy

Republic Steel Lockers offer industrial management decided advantages in service and economy.

Big and roomy—interiors are well designed for convenience and ventilation. Strong and sturdy—made of steel to assure complete protection of personal effects and tools. Heavy-duty construction throughout.

Bonderized! This exclusive Republic feature provides a superior base for the baked-on enamel finish. Offers protection against rust and corrosion. Restricts bumps, scratches, abrasions of everyday service to the site of the injury. Reduces maintenance costs to a minimum.

Republic Steel Lockers are available with any of the popular locking devices. Handle is attached with a tamper-free Gulmite screw and lockwasher. Practically pilfer free.

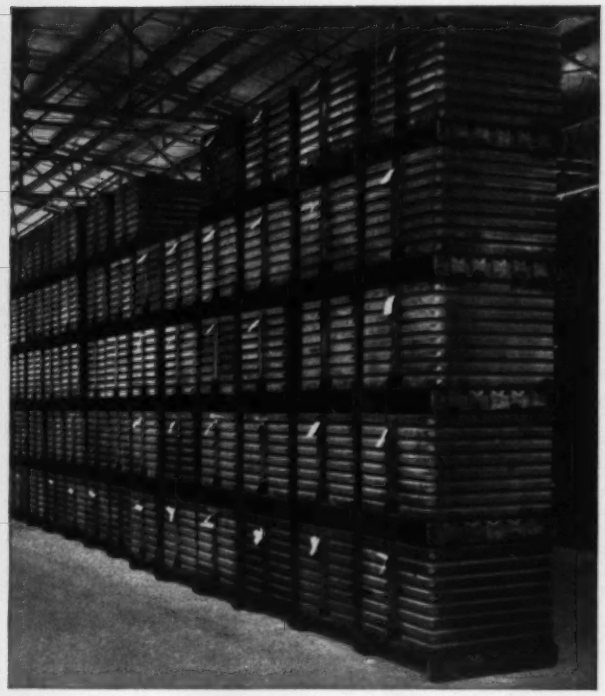
Call your Republic-Berger representative. He will help you with your locker planning and assume full responsibility for complete installation.

QUALITY CONTROL CHART

- ✓ ALL PARTS BONDERIZED
- ✓ 16-GAGE FORMED CHANNEL FRAME
- ✓ CONTINUOUS DOOR STRIKE
- ✓ POSITIVE AUTOMATIC LOCKING
- ✓ TAMPER-PROOF LATCHING
- ✓ ALL PARTS FLANGED FOR STRENGTH
- ✓ SIDES AND BACKS INTERCHANGEABLE
- ✓ DOUBLE LEAF PIN STYLE 2" HINGE
- ✓ BOLTS AND NUTS ZINC PLATED
- ✓ ALUMINUM BALL-POINT HOOKS
- ✓ BAKED-ON ENAMEL FINISH
- ✓ QUIET OPERATION
- ✓ SNAG-PROOF CONSTRUCTION
- ✓ ENGINEERED VENTILATION
- ✓ POSITIVE LATCHING
- ✓ LOW MAINTENANCE

OK for purchase

CALL YOUR REPUBLIC-BERGER REPRESENTATIVE, OR WRITE . . .



COMPLETE CONTAINERIZATION... Republic Box and Skid Units provide for multi-purpose service for delivery of semi-finished parts to production, feeding parts to machines, receiving finished parts as they come off the machining line, and storage. Complete production and inventory control from raw materials to finished products. Materials handling engineers will help you with your planning.

REPUBLIC WEDGE-LOCK® SHELVING is designed to handle heavy-weight storage. Wedge-Lock construction includes the three prime essentials of good shelving: 1. a post that will not bend, 2. a reinforced shelf that does not sag, and 3. a concealed sway-proof joint. Republic's Berger Division offers a complete line of shelving, storage units, and shop equipment to meet your needs.

REPUBLIC METAL LUMBER® solves framing problems fast. Simply measure, cut, assemble with ordinary bolt and nut fasteners. METAL LUMBER is fabricated from cold rolled steel to assure uniform physical properties, and high strength-to-gage ratio. Bonderized after fabrication for complete protection of all exposed surfaces. Available in two gages, two widths, in standard bundles of either 10- or 12-foot lengths. Write for more information.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

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1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send additional information on the following:

- ☐ Republic Steel Lockers
- ☐ Materials Handling Equipment
- ☐ Wedge-Lock Shelving ☐ METAL LUMBER

Name_____ Title_____

Firm_____

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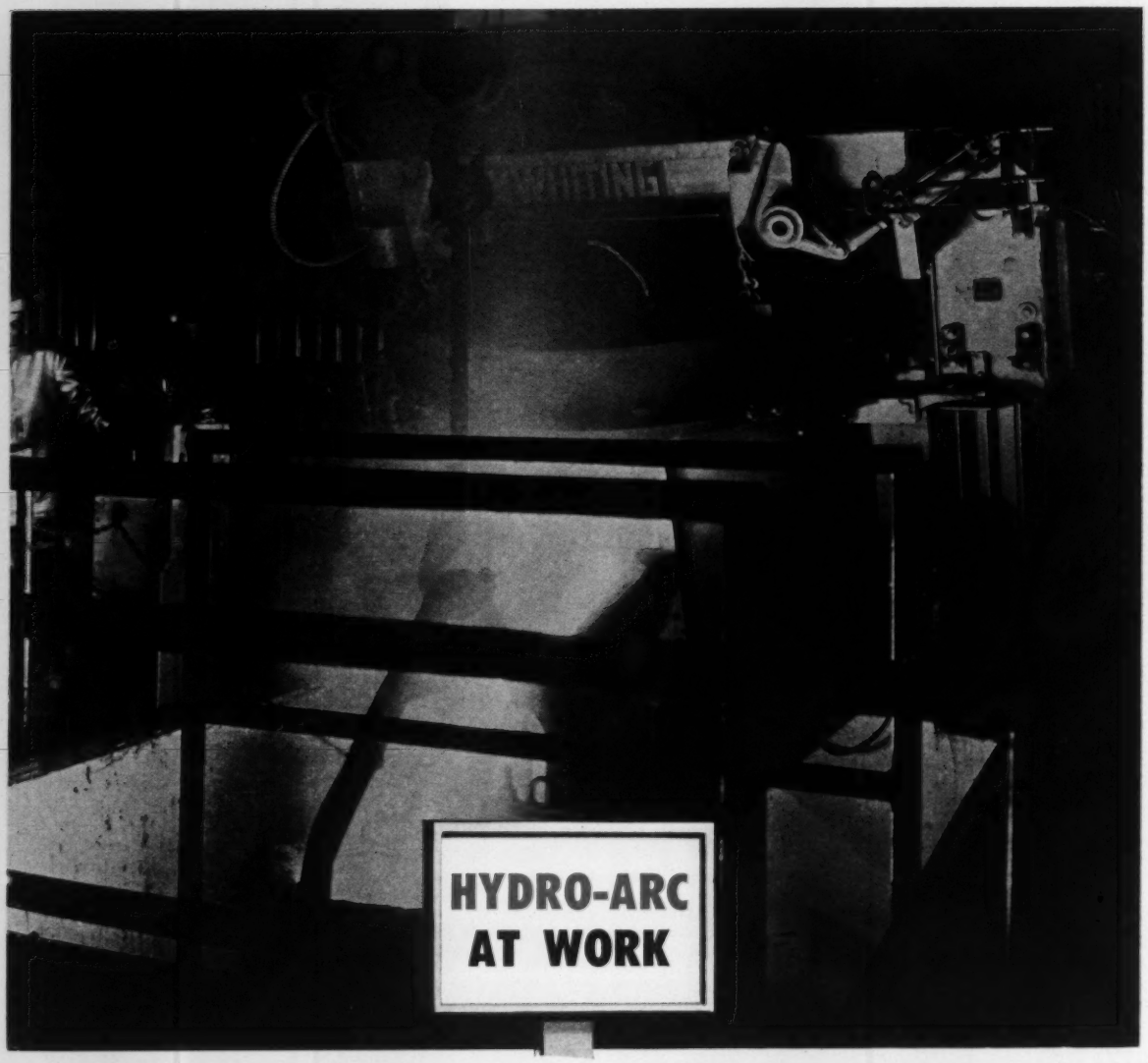
City_____ Zone____ State_____



ASSURING PRECISE CONTROL IN PRODUCING SPECIAL ALLOYS

The H. M. Harper Company of Morton Grove, Illinois, manufactures extruded shapes and fasteners from their own special alloys of stainless, non-ferrous and carbon steel. To produce these quality alloys, Harper metallurgists specified this Whiting Hydro-Arc electric furnace.

Hydro-Arc assures complete control of the heat as self-adjusting electrodes automatically seek—and maintain—the precise arc level for maximum efficiency. This full-time arc action means cleaner heats at less consumption, with virtually no electrode breakage. Harper gets exactly the alloys desired, at predictable cost and significant savings.

Learn how Hydro-Arc can lower *your* melting costs while increasing production quality. See your Whiting Furnace Engineer, or write for Hydro-Arc Catalog FY-168. *Whiting Corporation, 15643 Lathrop Avenue, Harvey, Illinois. In Canada: Whiting Corporation (Canada) Ltd., 350 Alexander Street, Welland, Ontario, Canada.*

90 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

ELECTRIC FURNACES

WHITING

MANUFACTURERS OF CRANES: TRAMBEAM® HANDLING SYSTEMS; PRESSUREGRIP; TRACKMOBILES;® FOUNDRY, RAILROAD, AND SWENSON CHEMICAL EQUIPMENT

3M Abrasives Cut Costs of Steel Utensil Finishing

Nationally famous, "Ekcoware" cooking utensils are manufactured here in the housewares division of Ekco Products, Inc., Massillon, Ohio. Prior to color buffing, these copper-clad stainless steel pans are given a final polishing.

Abrasives Ekco formerly used for this final finishing required a considerable amount of "break-in" time and caused many pan rejects.

Now, thanks to a 3M Representative's suggestion, Ekco has switched to 3M "PG" Wheels. The results have been remarkable. "PG" wheels have upped production 20%, eliminated one handling operation, reduced rejects, and produced a better finish on the pans. There's no "break-in" period either, as 3M "PG" Wheels maintain an even cut from installation to throw-away point.

Why not let 3M's new COST CHECK 5-4-5 Program help you to effectively investigate ways to lower costs and increase production. Discover:

- If your grinding can be done more economically
- If your finishing is as efficient as possible
- If your polishing can be done faster and better

Send today for a free COST CHECK 5-4-5 Review Form without obligation. Put 3M's years of abrasive know-how at your disposal.

3M Coated Abrasives

SEND IN TODAY

3M COMPANY Dept. ABH-120
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Send me my free COST CHECK 5-4-5 Kit.

COST CHECK 5-4-5

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MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

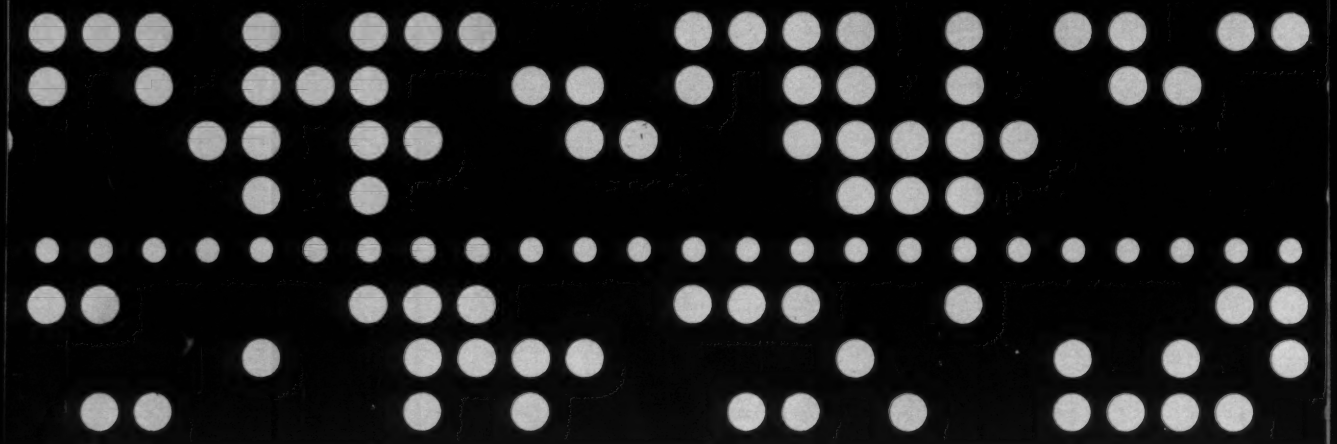
"3M" AND "PG" ARE REGISTERED TRADEMARKS OF 3M CO., ST. PAUL 6, MINN. EXPORT: 99 PARK AVE., NEW YORK 16. CANADA: LONDON, ONTARIO.

NEW FROM FAIR STREET • HOME OF THE JIGMIL

tapac*

tape control system for DeVlieg Spiramatic Jigmils®

ONS • ACCURATE HOLES AND FLAT SURFACES IN PRECISE LOCATIC



Now available for automatic programming of all Spiramatic JIGMILS, Tapac is DeVlieg's own system of numerical control. And it is so simplified, a tool engineer can master the programming technique in 3 to 4 hours.

Designed to make full use of JIGMIL'S inherent accuracy and precision, Tapac is a point-to-point system for automatic measuring, positioning and cycling complete parts programs utilizing 1" eight-channel standard punched tape input. Automatic functions include sequential or simultaneous positioning of vertical and horizontal slides, spindle depth control cycling and control of spindle speeds and feeds. *Automatic positioning repeats to within 0.0001".* The control system is comprised of simple plug-in electronics and standard proven components.

Come to Fair Street and see the Tapac system of automatic tape control for jigless boring and machining in our own production operations. Its accuracy, precision and flexibility will work equally well for you.

*Trademark—De Vlieg Machine Company

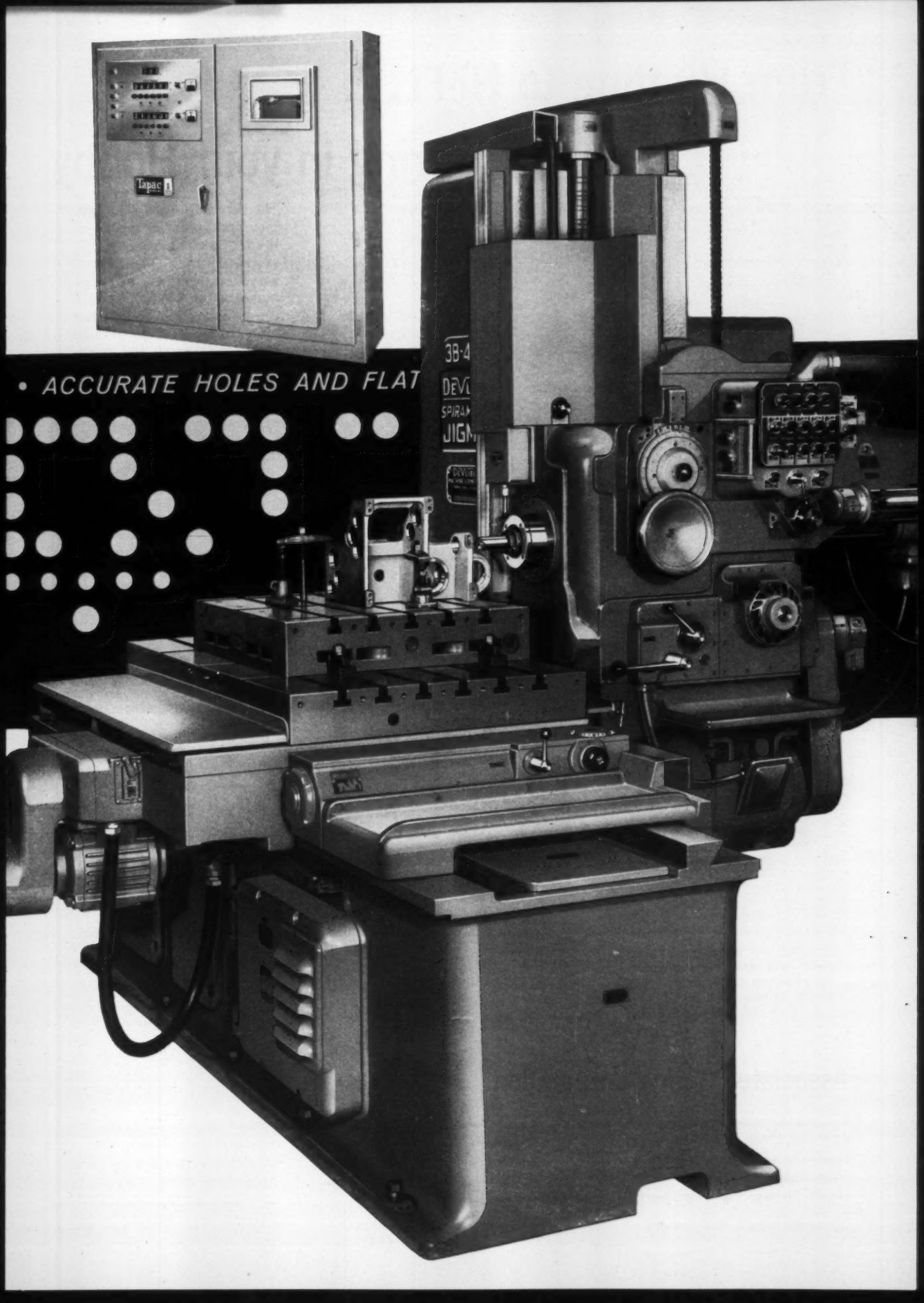
Rewarding revelations in automatic precision await your next visit to Fair Street

DeVlieg

SPIRAMATIC JIGMILS®

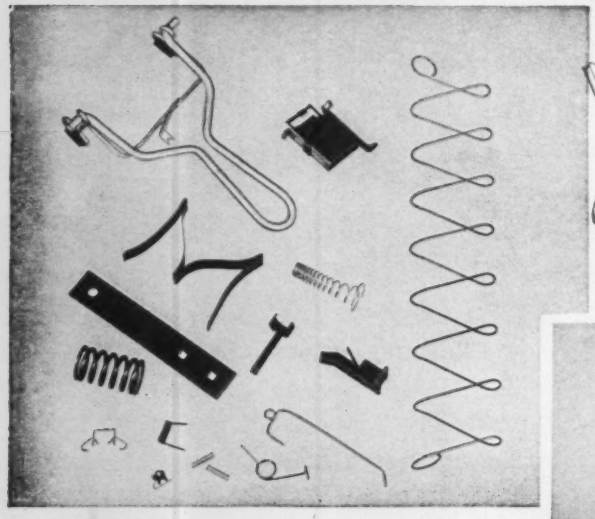
ACCURATE HOLES AND FLAT SURFACES IN PRECISE LOCATIONS

DE VLIEG MACHINE COMPANY, FAIR STREET • ROYAL OAK, MICHIGAN

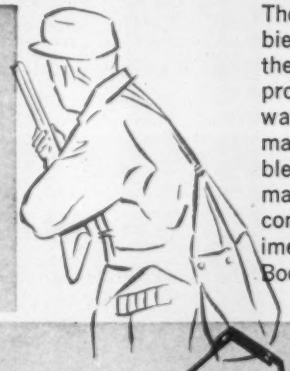

• ACCURATE HOLES AND FLAT

From Hunting to Hi-Fi . . .

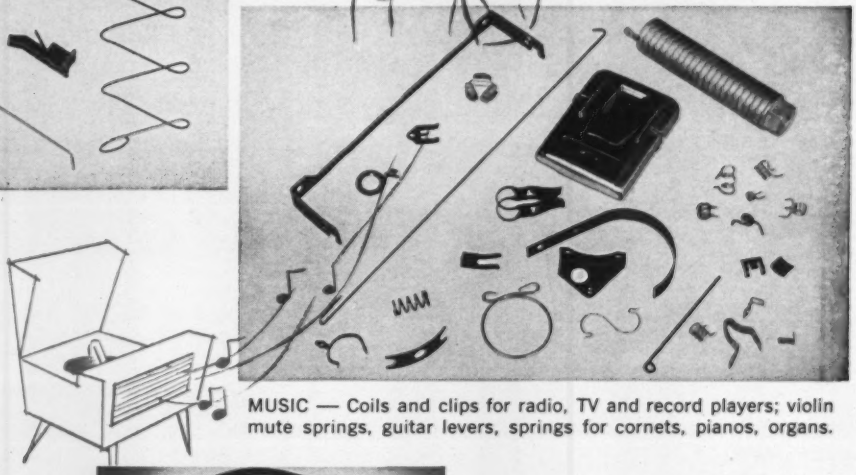
There's a Spring in your Hobby



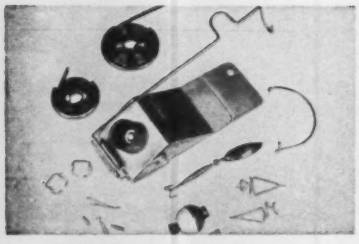
HUNTING — Ammunition clips, trigger springs and gun parts for civilian and military use; even a precision sling shot frame.



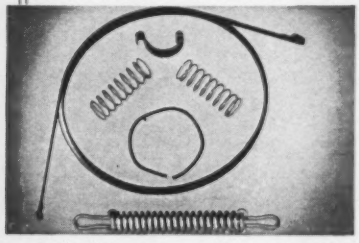
The booming market of hobbies and sports is typical of the far-reaching use of A.S.C. products. Often small but always important, springs make better products possible — and A.S.C. Divisions make better springs through constant research and experiment. Write for "The Picture Book of Springs."



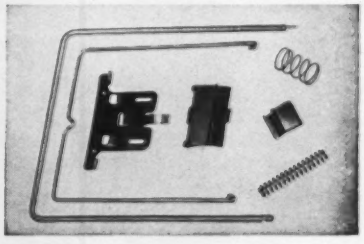
MUSIC — Coils and clips for radio, TV and record players; violin mute springs, guitar levers, springs for cornets, pianos, organs.



FISHING — power springs for reels; wire and flat springs for rod holders, lures; and a frog holder frame.



BOATING — starter springs and parts for outboard motors; shock-absorber spring for trailers; rope tightener spring.



PHOTOGRAPHY — view finder frames, shutter springs and stampings for movie and still cameras.

Associated Spring Corporation

General Offices: Bristol, Connecticut

Wallace Barnes Division, Bristol, Conn. and Syracuse, N. Y.
B-G-R Division, Plymouth and Ann Arbor, Mich.
Seaboard Pacific Division, Gardena, Calif.
Cleveland Sales Office, Cleveland, Ohio
Raymond Manufacturing Division, Corry, Penna.
Ohio Division, Dayton, Ohio
F. N. Manross and Sons Division, Bristol, Conn.
San Francisco Sales Office, Saratoga, Calif.
William D. Gibson Division, Chicago 14, Ill.
Milwaukee Division, Milwaukee, Wis.
Dunbar Brothers Division, Bristol, Conn.
Wallace Barnes Steel Division, Bristol, Conn.
Canadian Subsidiary: The Wallace Barnes Co., Ltd., Hamilton, Ontario and Montreal, Quebec

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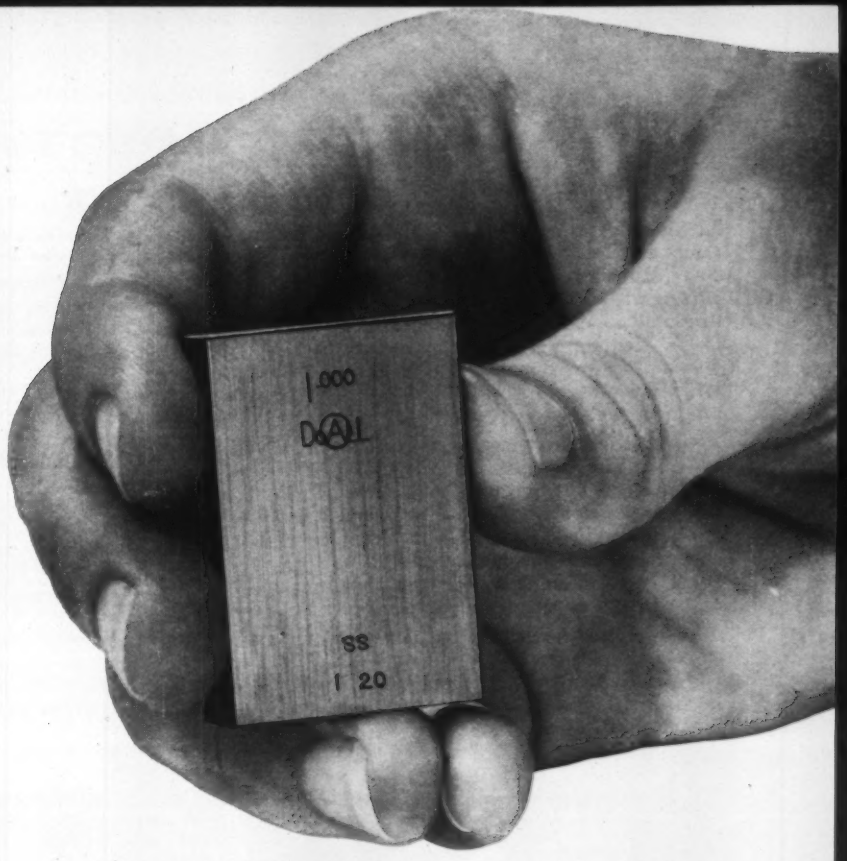
DoALL tells how Lindberg equipment helps produce stainless steel gage blocks



For the DoALL Company, Des Plaines, Illinois, heat treatment of their Stainless Steel Gage Blocks was a most formidable problem. For lasting accuracy these blocks require extremely hard, wear-resistant surfaces, free from growth or shrinkage, as provided by nitrided stainless steel. Case depth must be controlled accurately and the core maintained at full toughness free of stresses. DoALL found the answer to this problem with a Lindberg Gas Fired Vertical Cyclone Tempering Furnace with a Nitriding Retort.

DoALL

Norman Silver, Chief Metallurgist, and Lindberg Vertical Tempering Furnace at DoALL Company.

NORMAN SILVER, Chief Metallurgist says, "Our Lindberg equipment supplies the uniformity of heat distribution and the fast accurate control that is needed for the exacting requirements of our product. The furnace responds to control almost instantaneously and maintains the temperature within plus or minus 5°. Its 38" diameter by 36" depth handles 200 to 300 pound loads for the desired production. Results obtained have satisfied us completely with this, the latest of our Lindberg furnaces".

Lindberg provides the most complete line of heat treating furnaces, fuel fired or electric, large or small, for every heat treating requirement. Your Lindberg Field Representative (see your local classified directory) will be glad to consult with you on your heat treating requirements or write us direct. Heat Treating Furnace Division, Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, South Africa, Spain, Switzerland and West Germany.

LINDBERG
heat for industry

Unique new use of special

In manufacturing, fragility and heavy maintenance costs are intolerable. That's why General Electric's F. W. Rueblinger investigated the replacement of milling cutters with diamond abrasive wheels in his arc-quencher finishing operation. As Manager of Manufacturing of G-E's Medium Voltage Switchgear Department, Philadelphia, he was dissatisfied with having to maintain a large inventory of cutters and to keep men working around the clock sharpening and replacing them.

Arc-quenchers are made of a hard and extremely abrasive asbestos compound. This presented such a problem that all but one of the abrasive people consulted threw in the sponge. The one who didn't was Bay State distributor Vince Flynn. He arranged for key General Electric production men to meet with Bay State's Research Staff in Westboro and the problem was examined from every possible angle.

Finally, after extensive development work, Bay State engineered a special 12″ diamond wheel that cut fast and maintained the extremely fine tolerances necessary in the finishing of these important parts of Metal-clad Switchgear.

With as many as 136 wheels on a single arbor simultaneously making ¼″ deep cuts, the problem of driving power alone could have been disastrously troublesome. However, the wheels Bay State developed cut so easily that it was possible to increase the feed rate nearly 400% . . . and overall productivity went up a good 50%!

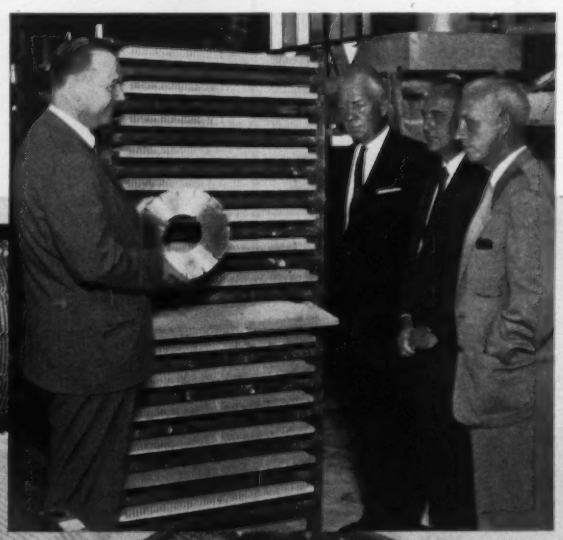
On top of these already proven advantages, wheel life is estimated at three full years so the constant down-time problems that used to arise from the need for cutter maintenance is entirely a thing of the past.

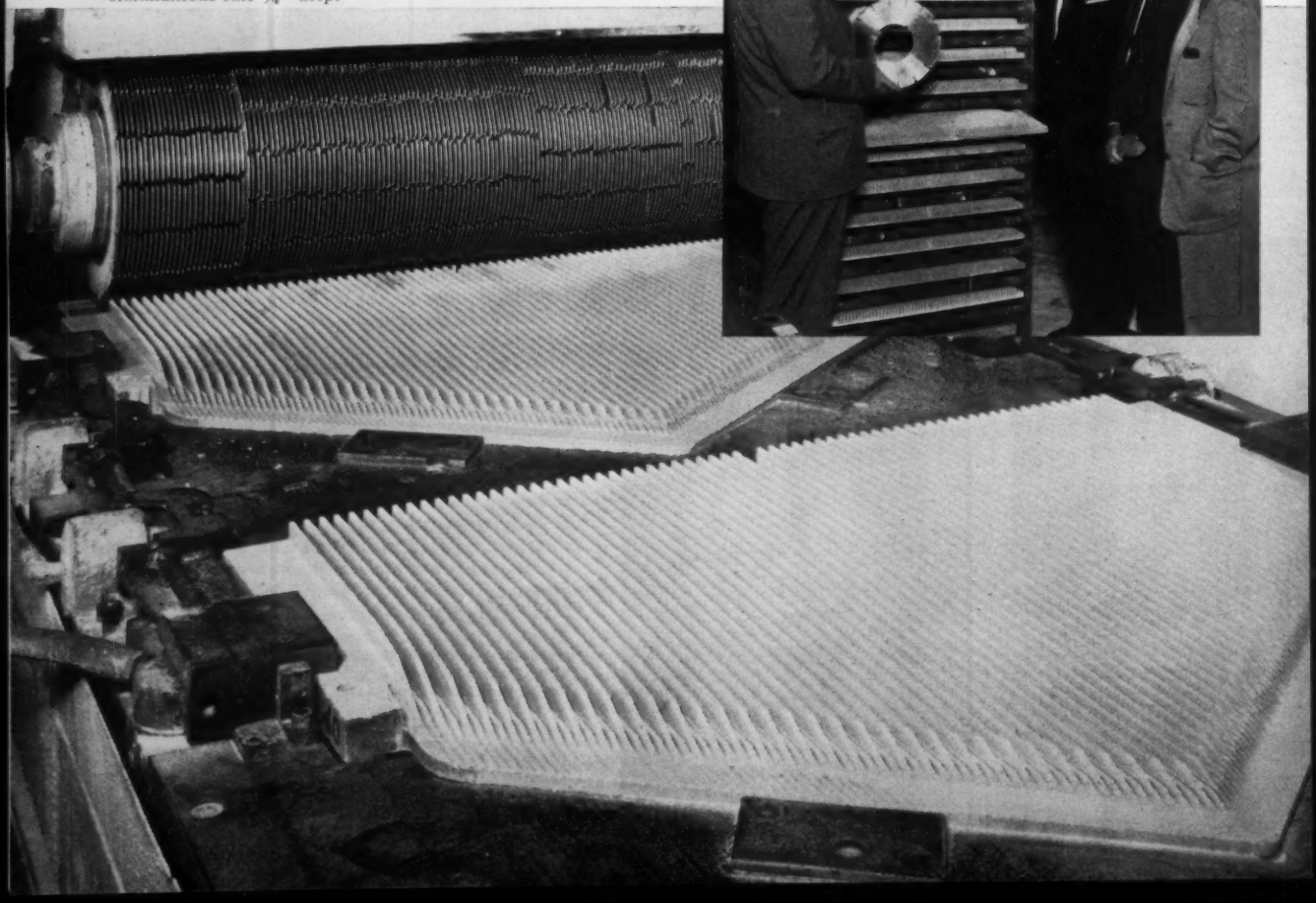
This outstanding success is not the end of the story. Now that General Electric's man-made diamonds are available for metal-bonded wheel applications, Bay State is engaged in intensive research into the even greater application potentials of this material.

Whether you have an unusually complex problem, or are simply trying to pare down costs, you'll find your Bay State distributor or direct representative is both hard-working and thoroughly experienced. *Better grinding at lower cost . . . that is his business.*

Right: Discussing the increased productivity that resulted from grinding, instead of cutting, hard asbestos-composition arc quenchers, are, left to right, Vincent J. Flynn, Bay State Distributor, F. W. Rueblinger, Manager-Manufacturing, John Stabb, Supervisor-Advanced Manufacturing-Engineering, and William A. Siter, Manager-Manufacturing-Engineering.

Below: Two arc-quenchers are shown immediately after passing under a tremendous array of 136 Bay State diamond wheels which have made simultaneous cuts ¼″ deep.





diamond wheels ups productivity 50%

Vincent J. Flynn was a Tool & Die Maker at the Frankford Arsenal when World War II came along and he joined the U.S.A.F. With this solid background in practical shopwork, he went into industrial distribution after the war, opening up his own business 5 years ago. Now a highly successful Bay State Distributor, he has this to say about Bay State: "They not only give me and my customers first-class service on routine problems . . . they also roll up their sleeves and dig in every time I come up with a puzzler . . . like this one, for example."

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

How to step up the output of your air tools

Are you wasting valuable production man-hours with a weak compressed air system? Here's how to make *sure* you get top output with air tools . . .

The experienced application engineers of Cooper-Bessemer and Rotor Tool will help you analyze your entire air system. This study includes compressor capacity needs, compressor location for greatest operating economy, air pressure regulation, the distribution system and portable tools. There is no obligation.

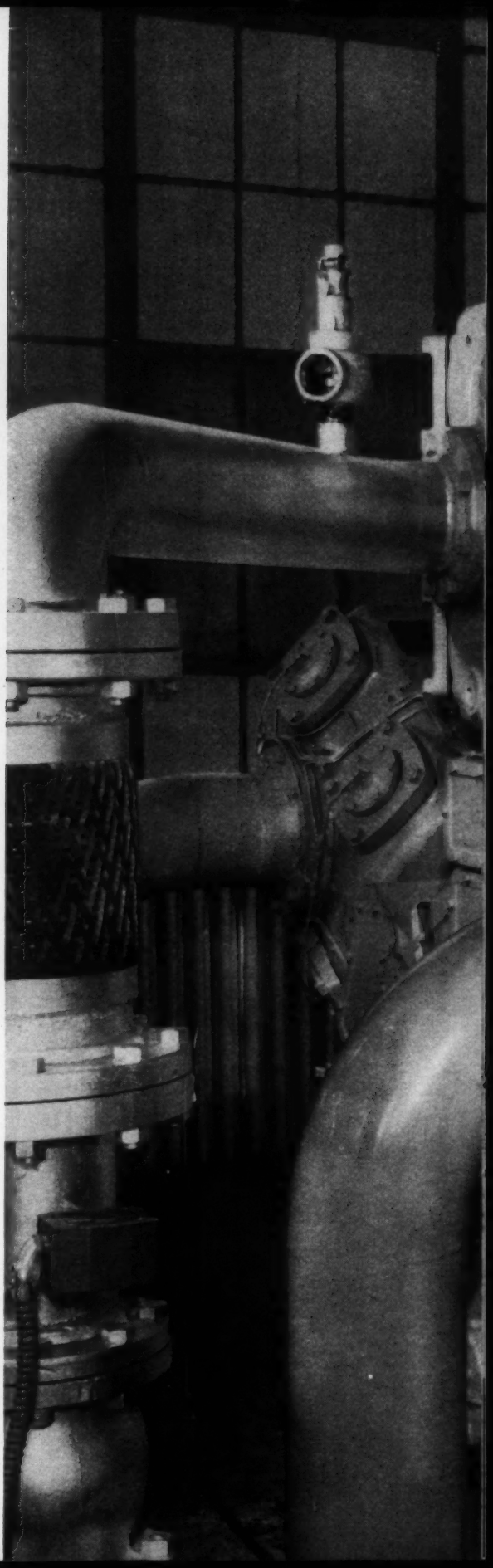
Call the nearest Cooper-Bessemer or Rotor Tool office.

BRANCH OFFICES: Grove City • New York • Washington Gloucester • Pittsburgh • Detroit • Chicago • Minneapolis • St. Louis Kansas City • Tulsa • New Orleans • Shreveport • Houston Greggton • Dallas • Odessa • Pampa • Casper • Seattle San Francisco • Los Angeles • *SUBSIDIARIES:* Cooper-Bessemer of Canada, Ltd. . . . Edmonton • Calgary • Toronto • Halifax Stratford • C-B Southern, Inc. . . . Houston • Cooper-Bessemer International Corporation . . . New York • Caracas • Anaco Cooper-Bessemer, S.A. . . . Chur, Switzerland • The Hague, Netherlands • Mexico City • The Rotor Tool Company, Cleveland

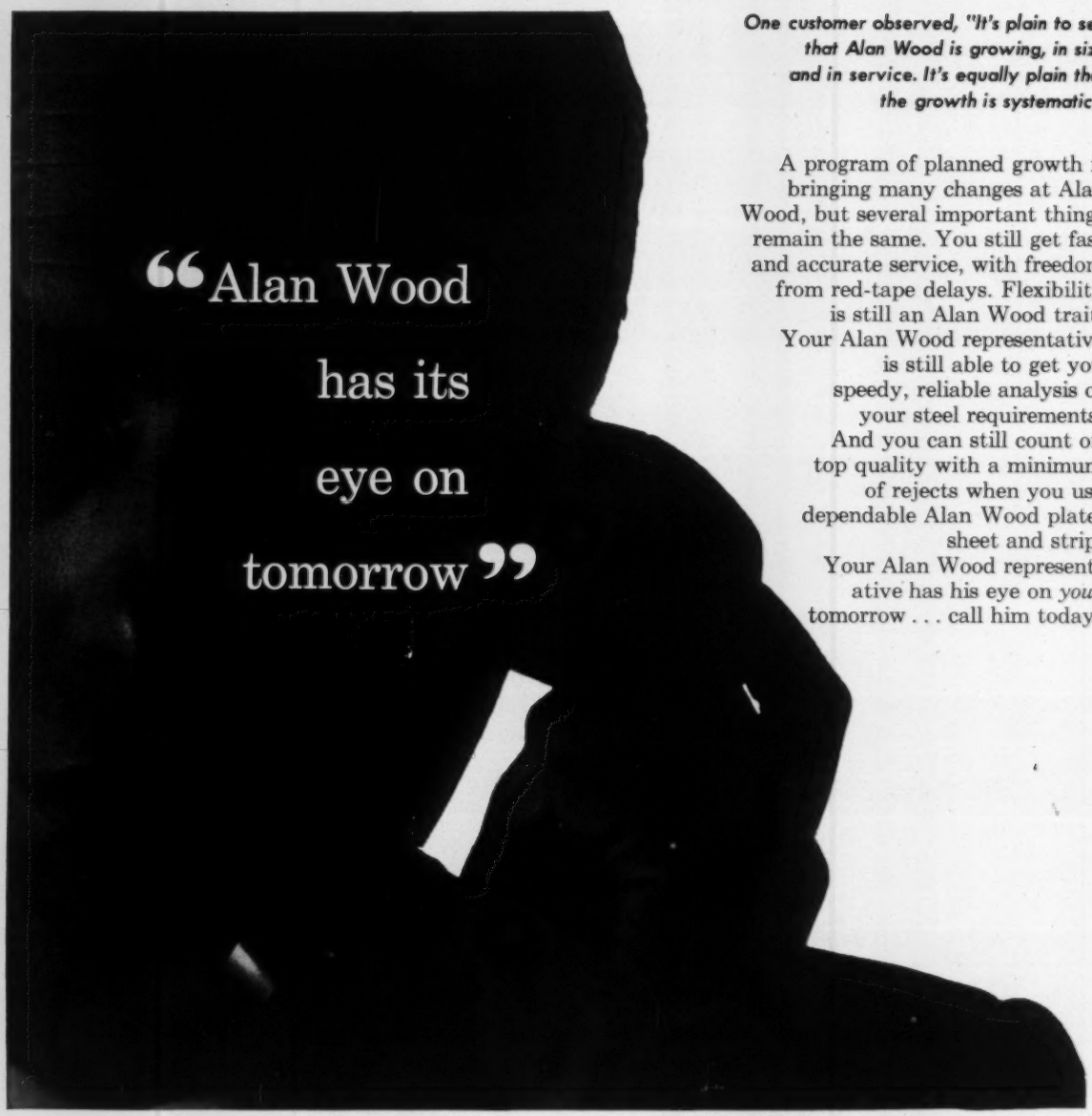
Cooper Bessemer

GENERAL OFFICES: MOUNT VERNON, OHIO

ENGINES - GAS - DIESEL - GAS-DIESEL
COMPRESSORS - RECIPROCATING AND CENTRIFUGAL
ENGINE, TURBINE OR MOTOR DRIVEN



NEW COOPER-BESSEMER DMR-3 AIR COMPRESSOR in foundry service. This highly compact 720 rpm compressor can be located strategically near the work area to reduce installation costs and help assure peak tool performance. Available for 572 to 2000 cfm and discharge pressures of 80 to 125 psig. Full details in Bulletin No. 94.



One customer observed, "It's plain to see that Alan Wood is growing, in size and in service. It's equally plain that the growth is systematic."

A program of planned growth is bringing many changes at Alan Wood, but several important things remain the same. You still get fast and accurate service, with freedom from red-tape delays. Flexibility is still an Alan Wood trait. Your Alan Wood representative is still able to get you speedy, reliable analysis of your steel requirements. And you can still count on top quality with a minimum of rejects when you use dependable Alan Wood plate, sheet and strip. Your Alan Wood representative has his eye on *your* tomorrow . . . call him today!

ALAN WOOD STEEL COMPANY

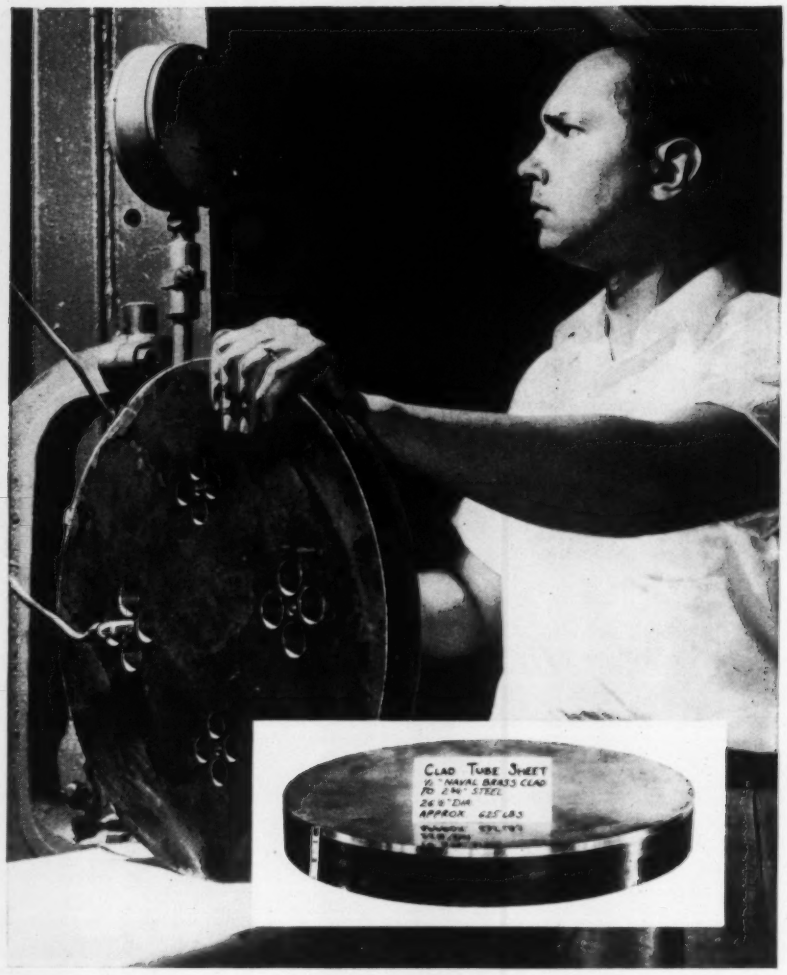
Conshohocken, Pa. • STEEL PRODUCERS WITH THE CUSTOMER IN MIND

DISTRICT OFFICES AND REPRESENTATIVES: Philadelphia • New York • Los Angeles • Boston • Atlanta
Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle
Montreal, Toronto and Vancouver, Canada: A. C. Leslie & Co., Limited

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

FOR SHEER, SHEAR STRENGTH



Hydraulic Pressure tests on Bridgeport Brass Company's patented cladding system show perfect no-leak bonds over 3000 psi.

...*Bridgeport Brass Uses EASY-FLO 45 to Bond Their Clad Metals*

The "thick and thin" of cladding—from .010 to 2¾" in a combination of ferrous and non ferrous metals—calls for a bonding agent that will hold under the most severe forming and service operations. The answer, in every respect, is Handy and Harman's silver brazing alloy, EASY-FLO 45.

The uses to which these clad metals are put range from the kitchen to power plants, refineries, chemical and food-processing installations. Famous Bridgeport Copperware, used by housewives throughout the country, is made from a triple-clad metal consisting of a sandwich of two sheets of .010 stainless steel bonded to both sides of a sheet of .025 copper. The metals are joined in Bridgeport's patented process at *finish gauge*. So strong is the bond that no difficulty is encountered in the forming operations which follow.

Tube sheets, though their uses are far from "domestic," require the same "bondability." Tests at Bridgeport show that shear strength exceeds 20,000 psi. And this involves the cladding of carbon steel to as many different metals as stainless, brass, Monel and copper.

The primary need here, of course, is strength. EASY-FLO 45 has other attributes that are more than welcome under *any* metals-joining conditions: thermal and electrical conductivity, gas- and liquid-tightness, ductility, ease of application and economy are some more that we'd like you to know more about. We are ready indeed to further acquaint you with the significant benefits of silver alloy brazing by sending you our Bulletin 20, which is a clear and comprehensive introduction to one of the simplest, *saving* metals-joining methods in existence. Handy & Harman, 82 Fulton Street, New York City 38.

Your No. 1 Source of Supply and Authority on Brazing Alloys

HANDY & HARMAN

General Offices: 82 Fulton Street, New York 38, New York

Stop looking for spring wire in large coils...it's here (*courtesy of Roebling*)

This is really an enormous availability — 3000 pounds of high carbon spring wire in a single, nonstop coil. You know what this means. Uninterrupted productivity. You make more of your products faster and, as with *any* length of Roebling spring wire, you make them better.

This, of course, is in addition to the already wide selection of Roebling wire in all kinds of sizes and gauges. Whatever you specify in spring wire — for quality — the word that comes first is Roebling.

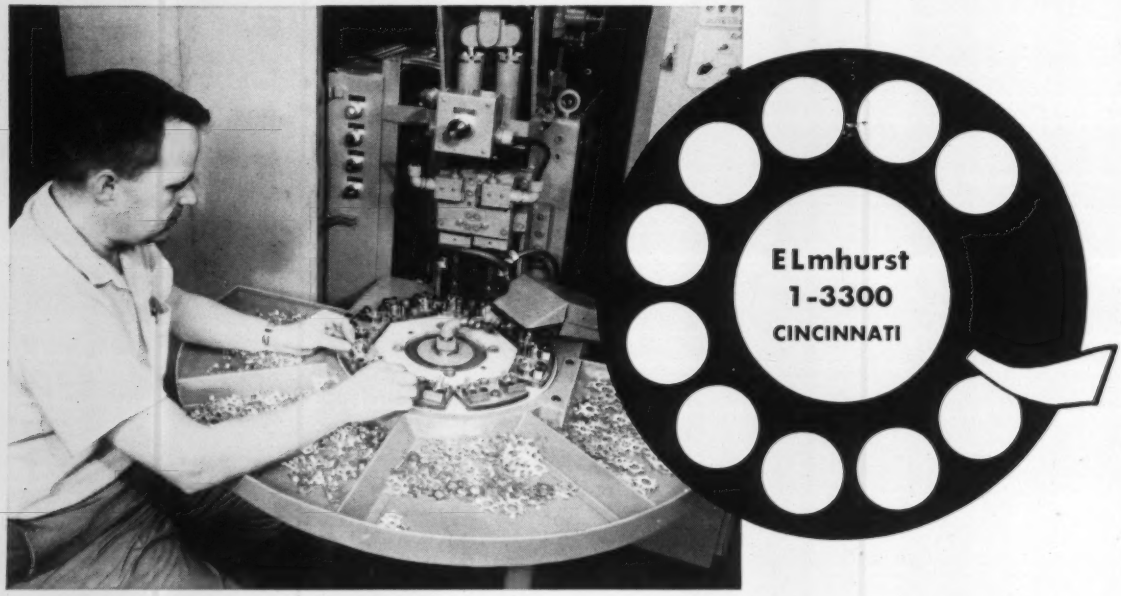
For information on *any* size coil, ask Roebling's Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

PRECISION® Quarterly NUMBER 7

PRECISION **WELDER** AND **FLEXOPRESS** CORPORATION, 3520 Ibsen, Cincinnati 9, Ohio



Success Buys Success

CINCINNATI—When you need a new machine you believe your own eyes first, and the manufacturer's superlatives second. Right? You go to watch a similar machine operate in a competitor's plant, or, as Packard used to say, you "ask the man who owns one." Right?

Something of the sort seems to be happening in the electrical components industry, where a good deal of watching the other guy's operations goes on. Word has been getting around that Precision machines are worth keeping an eye on. We've even heard it said that difficult jobs for resistance welders or high productivity presses become easy if you call in Precision Welder and Flexopress Corp. of Cincinnati. This we will be the first to deny.

Difficult jobs don't come easy, even for Precision Welder and Flexopress. But they become *solved,* like that dual-head assembly-welder in the picture. We built it for a big maker of communications equipment, so that your telephone dial can go on spinning for a million numbers without cracking up. Or the foil-butt-seam welder we built to make big pieces of steel out of little pieces, so that an automobile maker can use good metal that would otherwise have become scrap.

Or the high speed-press we built with an intelligent feed that gages position by the design lithographed on the metal it is stamping.

But enough of this blowing our own horn. We asked the men who bought Precision equipment what they thought and we got answers like this:

"We buy high quality, high cost equipment because it produces high quality, low cost products. And on those, we can make money."

"We bought a Flexopress because it was guaranteed to exceed specifications —and it does. Seems to me that justifies a higher price."

"We're joining expensive, critical components. They can't be reworked, we can't afford scrap, and we have to guarantee a high level of reliability. Under such circumstances we naturally look for equipment – like Precision makes—that guarantees the kind of reliability we have to guarantee our customers in turn."

Gosh.

Right at the moment we are building automated resistance welders and high productivity presses for successful manufacturers whose success depends on a foundation of quality equipment. Without hesitation, we recommend the same system to you. You might call us about it today. You'll find our number is on the dial above.

PRECISION

Order ALCOA ALUMINUM FASTENERS from your Yellow Pages!

. . . save time and money

It's a fact. In the Yellow Pages of your phone book you'll find a local distributor of Alcoa® Aluminum Fasteners. He maintains full stocks—aluminum bolts, nuts, rivets, machine screws, wood screws, sheet metal screws, washers, any aluminum fastener you need.

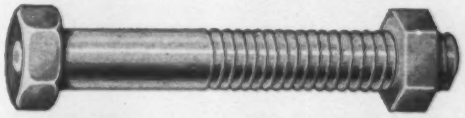
No need to stock a lot of fasteners yourself. No need to run short, either. Your local Alcoa distributor offers the largest line of aluminum fasteners available today. So, besides the *other* advantages of using Alcoa Aluminum Fasteners—to cut your production costs, and improve product appearance, and boost product performance—you can simplify your inventory control.

Alcoa Aluminum Fasteners are corrosion resistant, have full threads, no burrs, and are produced from fully heat-treated, high-strength alloys. And one thing more! You'll get *full count* every time, exactly what you order.

If you'd like more information or free samples, mail the coupon!

ALCOA ALUMINUM

ALWAYS FASTEN ALUMINUM WITH ALCOA ALUMINUM FASTENERS



Aluminum Company of America
2001-M Alcoa Building, Pittsburgh 19, Pa.

Please send me complete specification data and samples of Alcoa Aluminum Fasteners.

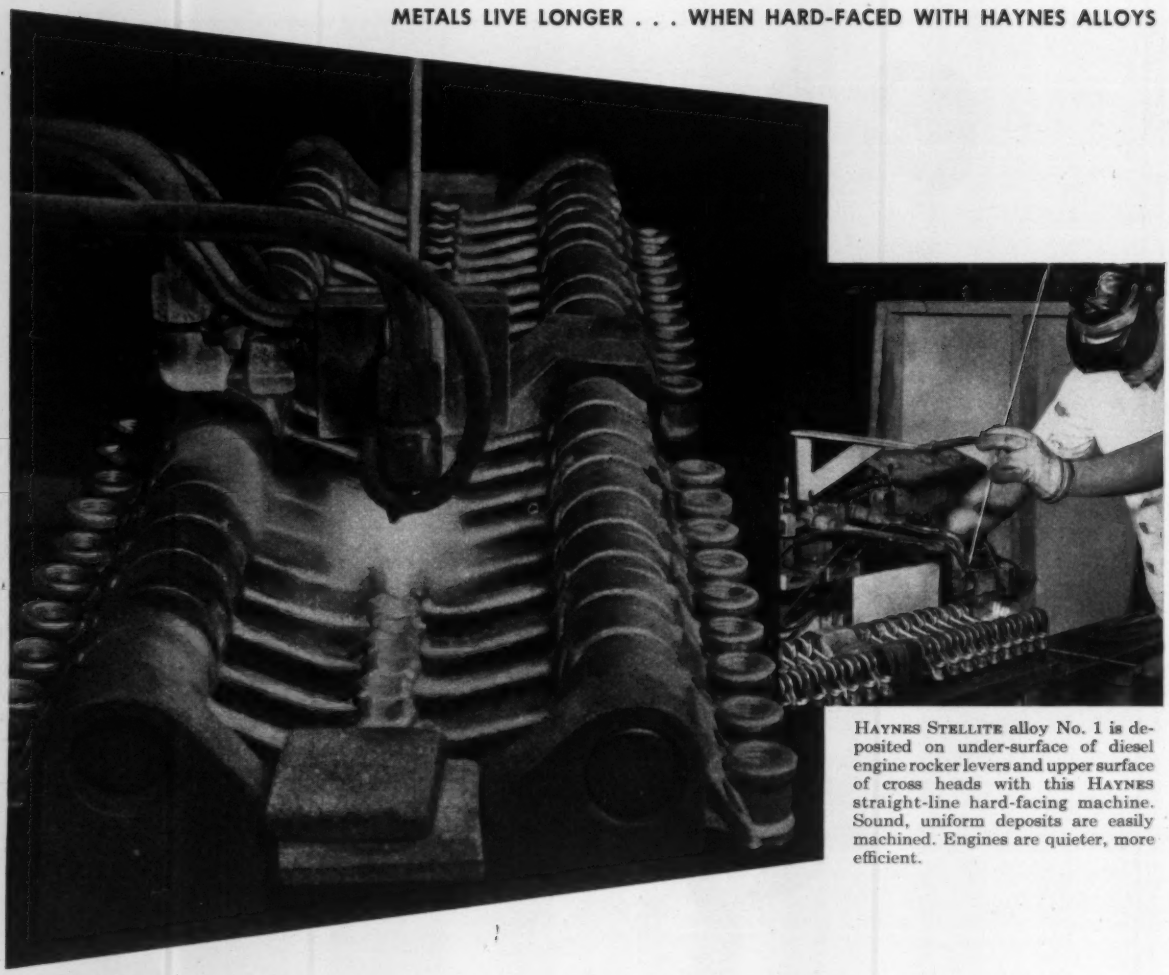
NAME_____ TITLE_____

COMPANY_____

STREET ADDRESS_____

CITY_____ ZONE____ STATE____

METALS LIVE LONGER . . . WHEN HARD-FACED WITH HAYNES ALLOYS



HAYNES STELLITE alloy No. 1 is deposited on under-surface of diesel engine rocker levers and upper surface of cross heads with this HAYNES straight-line hard-facing machine. Sound, uniform deposits are easily machined. Engines are quieter, more efficient.

HAYNES Rods Speed Up Production

Minimum deposit dilution. Close deposit control. Faster final machining. More operating efficiency in the end-product.

These are the advantages a major diesel engine manufacturer gained by hard-facing the wear areas on rocker levers . . . using HAYNES alloy hard-facing rods.

HAYNES alloys are available in a complete line of hard-facing rods that can speed up production. For parts subject to impact, abrasion, heat, corrosion, erosion—HAYNES iron-, nickel-, and cobalt-base alloys give the desired properties. Where extreme abrasion resistance is needed, there's HAYSTELLITE tungsten carbide tube rod. All can be applied by manual methods or with semi-automatic equipment. For spray hard-facing, HAYNES nickel-base, cobalt-base, and tungsten carbide powders are available.

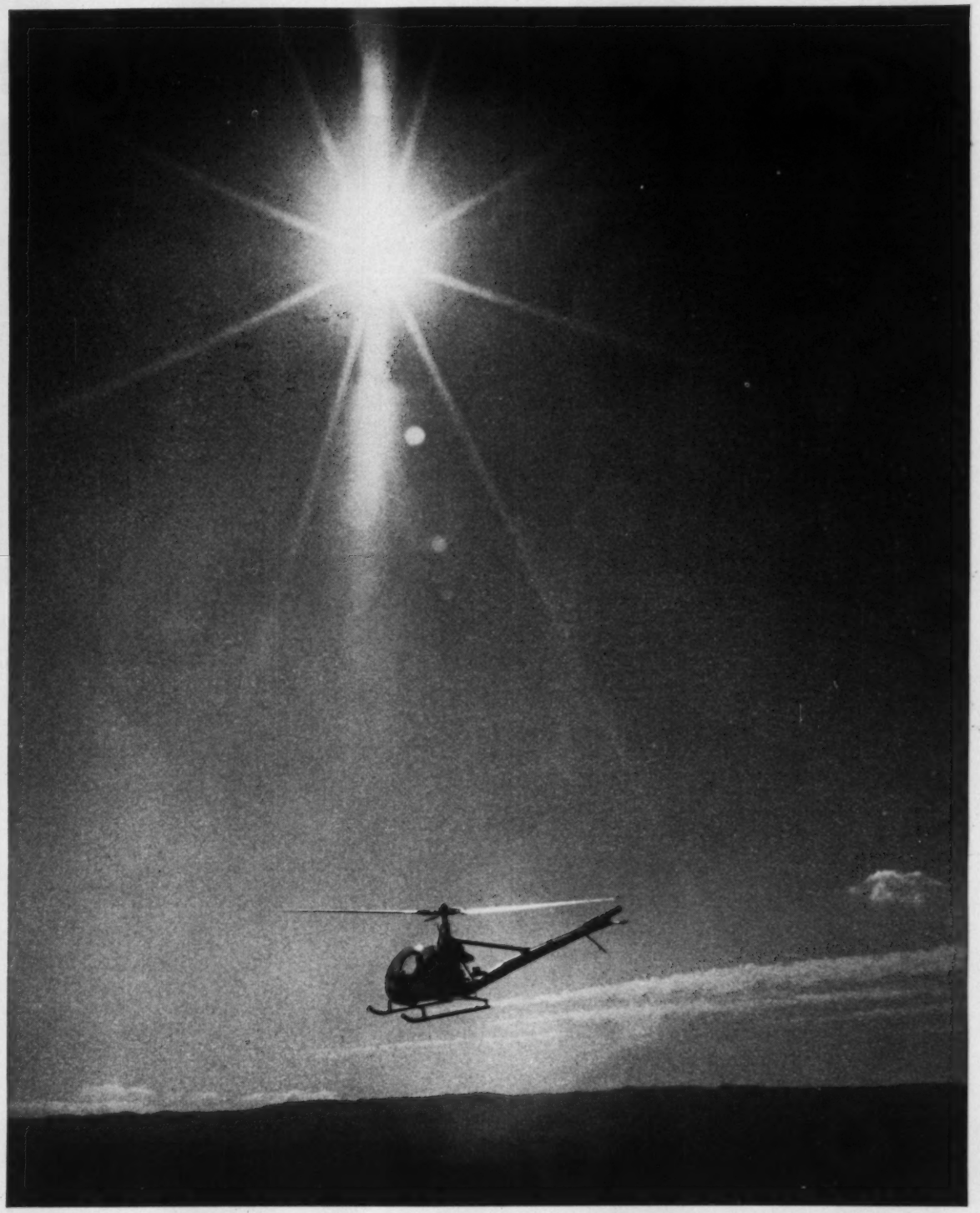
Our field engineers can help you determine which to use. Write for full information on the wide range of HAYNES Hard-Facing Alloys.

HAYNES
ALLOYS
HAYNES STELLITE COMPANY
Division of Union Carbide Corporation
Kokomo, Indiana

UNION CARBIDE

Address inquiries to Haynes Stellite Company, 270 Park Avenue, New York 17, N. Y.

The terms "Haynes," "Haynes Stellite," "Haystellite," and "Union Carbide" are registered trade marks of Union Carbide Corporation.



This bird grew up in a Gas-heated nest. The nest is the plant of Hiller Aircraft Corporation in Palo Alto, California, where gas is used exclusively in the heat processing of aircraft parts. From the big bubble up front to the rotor blades in its tail, nearly every part of a Hiller helicopter is processed with gas heat. Gas heat cures plastics, anneals metals, dries paint, heats solutions for plating . . . keeps the plant itself warm in winter. Hiller Aircraft—and thousands of other companies—use gas heat because it is completely controllable, fast, clean, economical. Gas is technically right and economically sound for all types of heat processing. Call the Industrial Sales Engineer at your local gas company for specific technical help. *American Gas Association.* **FOR INDUSTRIAL HEATING GAS IS GOOD BUSINESS**

THE MAN & THE DRIVES

FROM WESTINGHOUSE

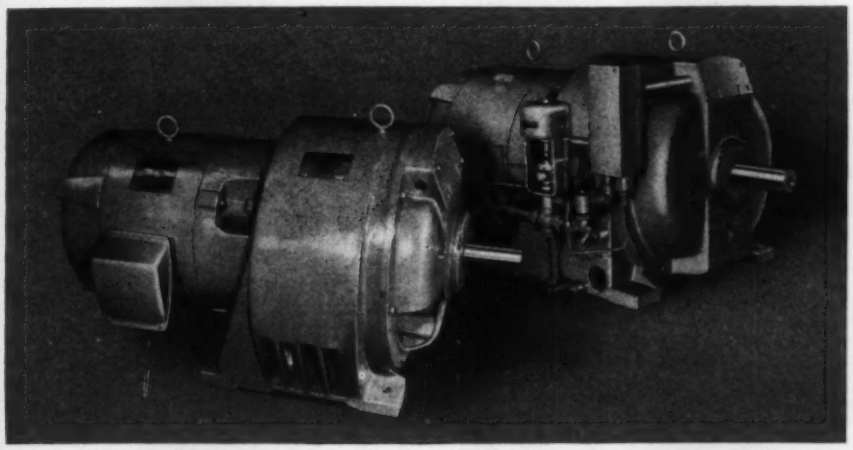
Mr. Westinghouse and MagnaFlow Drives Bring Simple Solution to Speed Control Problems, Save Money and Space, Too!

Westinghouse MagnaFlow* electromagnetic drives—air or liquid cooled—provide infinitely adjustable speeds from standstill to top speed with regulation guaranteed at $\pm 2\%$ of top speed over a 17-to-1 speed range (even closer regulation when desired). Control is smooth and stepless.

These compact drives, having a minimum number of parts, are built for rough, trouble-free service. The unique electromagnetic coupling maintains adjustable output speed without the use of pulleys, belts, brushes, commutators, slip rings or rotating windings. A rugged Life-Line® "A" motor supplies reliable a-c drive power. No power converting equipment needed—only a small, static exciter and an operator's control station. Initial cost is low; installation—easy and inexpensive.

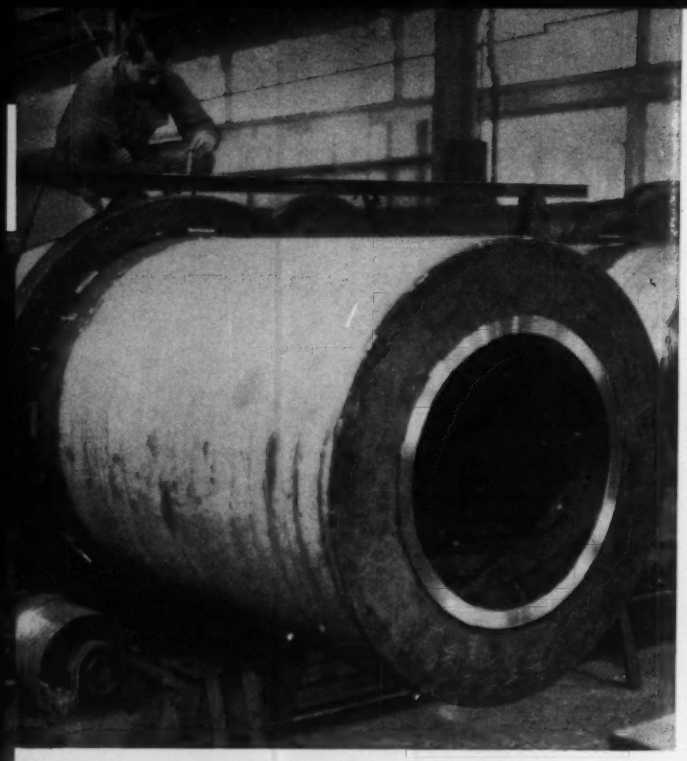
Your Man from Westinghouse is ready now to help you apply MagnaFlow drives . . . and any other drives you may need. Call him . . . or write for a copy of Westinghouse MagnaFlow Electromagnetic Drives (B-7875), Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. You can be sure . . . if it's Westinghouse. J-22162

*Trade-Mark



MagnaFlow drives—air cooled (foreground) and liquid cooled—are available in various horsepower ratings for winders, conveyors, fans, pumps, extruders and other machinery in all industries.

Westinghouse



... HOT

Temperature in this stainless steel rotary salt dryer will be 1600°F from combustion gases. It's used to demoisturize salt, one step in making high octane gas. C. O. Bartlett & Snow was the fabricator. They chose stainless steel because of its outstanding high temperature strength and resistance to high temperature oxidation.

COLD...

—443°F is only 16.4 degrees above absolute zero. That's one reason stainless steel is used in this heat transfer unit that helps simulate outer space conditions of near absolute zero temperature and one-billionth of an atmosphere. The all-stainless unit is named "PLATE-COIL," manufactured by Tranter Manufacturing, Inc., Lansing, Michigan.

USS Stainless Steels... no other metal makes such a material difference in so many applications

This mark tells you a product is made of modern, dependable Steel.

...and in between

No material can match stainless steel's versatility. Stainless steel offers designers and fabricators a unique combination of properties: superior strength, extraordinary corrosion resistance to an enormous variety of reagents, outstanding high temperature properties, and appearance. It is easily fabricated and, because stainless steel lasts longer, actually costs less in the long run. If you have a selection or delivery problem, ask your USS representative or nearest steel service center.

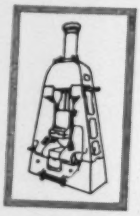
USS is a registered trademark

United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

CHAMBERSBURG

BUILDERS OF A COMPLETE LINE OF TOOLS FOR FORMING MATERIALS BY IMPACT



CECO-DROP

The most effective and economical gravity drop hammer. Air or steam operated. No boards to change, no back rods to lift. Safer, easier operation. Equipped with non-slip piston rod clamp, ram die-setting control and nylon-cushioned stroke control. New "Blowmatic" program controller for semi-automatic forging available. Sizes 500 lbs. to 10,000 lbs. Ask for Bulletin No. 80-L-7.

FORMING DROP

An air-operated, piston-lift, gravity-drop hammer designed especially for operations common to coining presses, compacting presses, strap hammers, pneumatic drop hammers, etc. May be operated manually, semi-automatic or completely automatic. Electric control system. Sizes 500 lbs. to 5000 lbs. Ask for Bulletin No. 73-L-7.

BOARD DROP HAMMER

The best of the board drop hammers. Belt or motor drive. Unique board clamp arrangement and improved roll design promcte better board life, result in less down time. Unusual strength and rigidity. Sizes 100 lbs. to 5000 lbs. Ask for Bulletin No. 90-L-9.

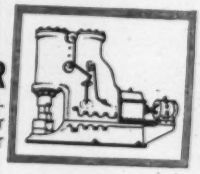
CECOSTAMP

An air-operated impact drop stamp that produces a controlled blow or a "squeeze" instantly, at the will of the operator. Gives a permanent set to all the formable metals—even high strength alloys. Popular in iron foundries as inexpensive, highly productive tool for restriking malleable castings. Sizes from 21" x 18" platen area to 120" x 120" platen area. Ask for Bulletin No. 30-L-5.

STEAM DROP HAMMER

Designed to produce forgings at lowest cost per piece. Unique differential porting on Model "E" makes for the most efficient use of steam or air—greatest economy of power. Unusual strength and rigidity reduces down time, maintains alignment, increases production. Sizes 1000 lbs. to 16,000 lbs. Ask for Bulletin No. 55-L-4.

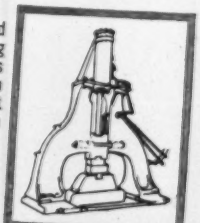
PNEUMATIC HAMMER



Popular motor-driven hammer with self-contained compressor, for flat-die or blacksmithing operations. Ideal for tool dressing, for research laboratory work, etc. An exceptional forging tool, independent of steam or air lines. Sizes 200 lbs. to 5000 lbs. Ask for Bulletin No. 16-L-9.

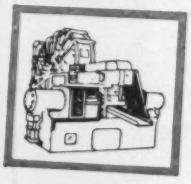
SINGLE FRAME HAMMER

High frame provides greater working space. Specially designed forged alloy steel dies ease stock manipulation. Power-saving cylinder cuts operating costs. Preferred for forging large discs and rings, upsetting high stems, etc. Ram guides supported on 5 sides. Sizes 750 lbs. to 6000 lbs. "Power/trol" power-assist controls on 2500 lb. hammers and larger. Ask for Bulletin No. 1-L-4.



DOUBLE FRAME HAMMER

Large working space for special or routine jobs. Well suited for making large rings, cogging and drawing out toughest alloy steels and high temperature "exotic" metals, making large axle forgings, etc. Heavy 15:1 anvil increases blow effectiveness. Sizes 2000 lbs. to 24,000 lbs. "Power/trol" power-assist controls on 3000 lb. hammers and larger. Ask for Bulletin No. 74-L-7.



THE IMPACTER & CECOMATIC FORGING

The revolutionary Chambersburg Impacter forges by means of horizontally-opposed rams striking the stock simultaneously from both sides. This new concept of the forging process makes possible the continuous, automatic production of drop forgings. Fully described in Bulletin No. 87-L-9.

TRIMMING PRESSES • R. R. WHEEL PRESSES • BUSHING PRESSES

CHAMBERSBURG ENGINEERING COMPANY • Chambersburg, Pa.

SEALED! SHIELDED! PROTECTED!

hoover quality BEARINGS AT THEIR BEST

Hoover bearings achieve highest quality standards through the use of exclusive *Micro-Velvet* balls, accurate within millionths of an inch, and *Hoover-Honed* raceways that are super smooth, superbly finished.

To preserve this superior quality throughout extended life, Hoover bearings can be protected with shields and seals to lock out dirt, grime and other harmful contaminants. As shown above, shields, seals in Teflon and felt, and a combination of shields and seals meet a wide range of requirements. To assure highest quality . . . best protection . . . specify Hoover sealed or shielded ball bearings. Get complete information from your local Hoover bearing distributor listed in the Yellow Page Directory, or write us direct.

Micro-Velvet and *Hoover-Honed* are Hoover Trademarks. Teflon is a DuPont trademark for its fluorocarbon resins.

hoover

BALL AND BEARING COMPANY

5400 South State Road, Ann Arbor, Michigan

Zone Sales Offices and Warehouses | 8581 South Chicago Ave., Chicago 17, Illinois
290 Lodi Street, Hackensack, New Jersey
2020 South Figueroa, Los Angeles 7, California

Hoover Ball and Bearing Company S-12
5400 South State Road, Ann Arbor, Michigan

Please send me information on Hoover sealed and shielded ball bearings.

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

He increases production by making jobs easier

He air-powers production—simplifying work, multiplying output, cutting costs. When tool engineers need to speed drilling, fastening or other assembly processes, they call this Gardner-Denver man.

He's the Gardner-Denver Production Machine Specialist, an expert in automating all types of air tools. He helps design machines tailored to fit the job. He's backed by skilled craftsmen who make realities of ideas. Using simple, standard components, they build automatic machines to perform complex operations at speeds that amaze even veteran production men.

If you need a unique air tool setup to speed your production, a call to your nearest Gardner-Denver branch will bring this specialist to your plant.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

There's one exactly right for you...*Vancoram Chromium Alloys*

Because chromium improves steels and irons in so many ways, it has become one of the most economical and widely used alloying elements. Depending on the application and the percentage used, chromium imparts such properties as strength, hardness, toughness and corrosion resistance. The presence of chromium carbides also results in excellent cutting properties and wear resistance.

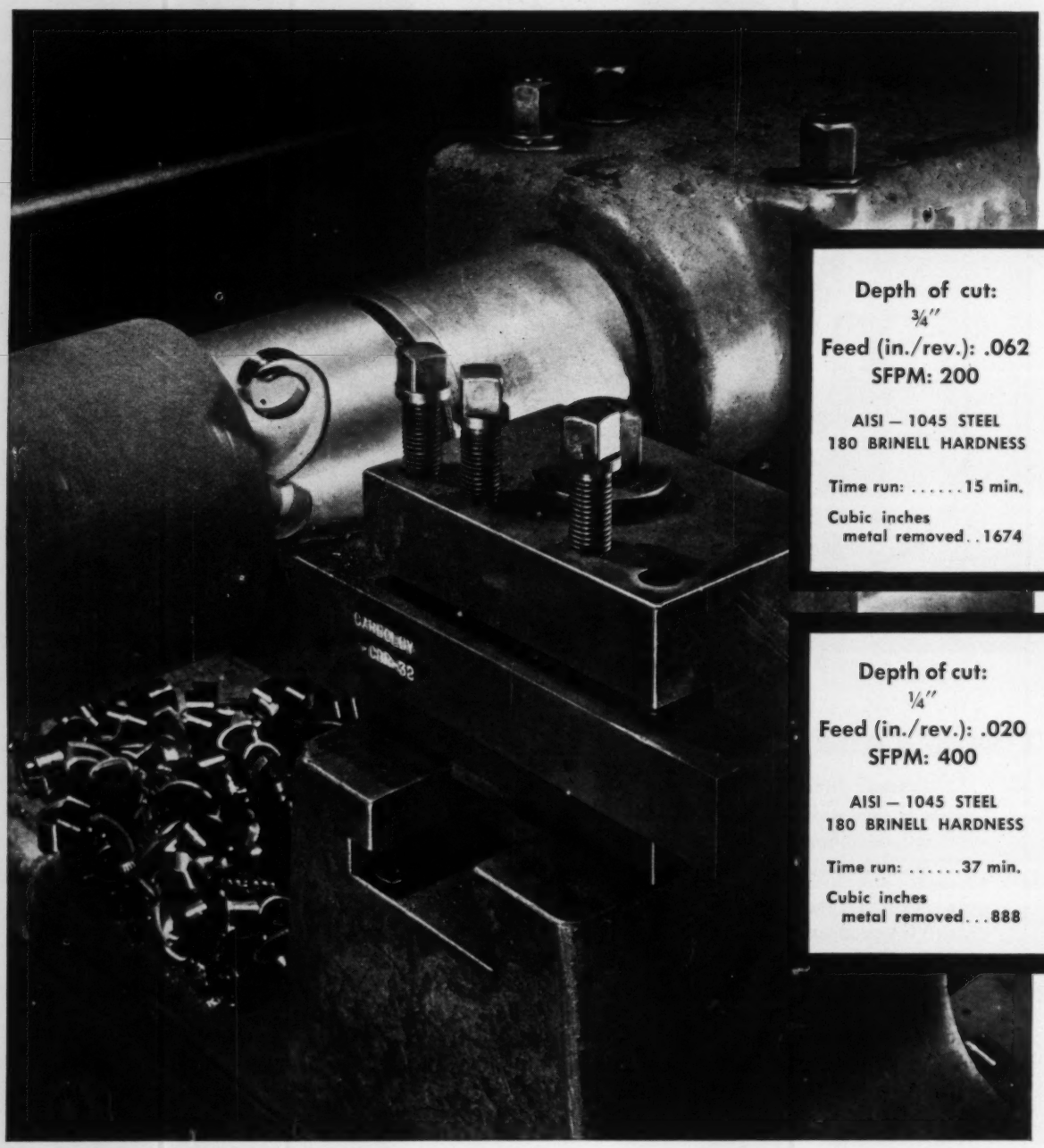
Naturally, for such a broad range of applications, no one alloy can serve for all uses; consequently, VCA produces more than thirty different chromium products, each tailored to do a specific job! The latest Vancoram Products list covers analyses and applications. VCA's technical staff will help you select the best for your needs. Just write or call your nearest VCA District Office. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N.Y. • Chicago • Cleveland • Detroit • Pittsburgh

Stainless Steel

VANADIUM
CORPORATION OF AMERICA
Producers of alloys, metals and chemicals

VANCORAM

Why ?



Depth of cut:
¾"
Feed (in./rev.): .062
SFPM: 200

AISI – 1045 STEEL
180 BRINELL HARDNESS

Time run: .....15 min.

Cubic inches
metal removed..1674

Depth of cut:
¼"
Feed (in./rev.): .020
SFPM: 400

AISI – 1045 STEEL
180 BRINELL HARDNESS

Time run: .....37 min.

Cubic inches
metal removed...888

Why is one Carboloy® carbide grade best for light-duty steel-cutting applications; another more suitable for heavy-duty jobs? And which should you use?

Carbide selection can be scientific (and *should* be!) if you are going to get optimum results from your steel-cutting operation.

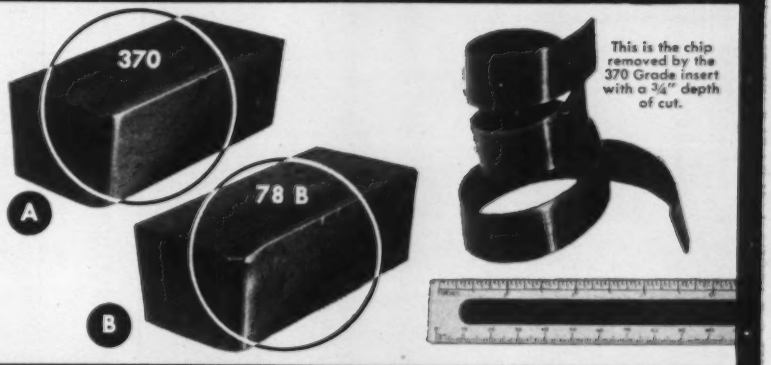
Take the job-graded Carboloy Grades 78B* and 370, for example. The 78B Grade is designed to offer real economy in normal steel-cutting applications—where machine power is limited. The 370 Grade, on the other hand, was developed specifically for heavy-duty steel-cutting jobs. Look over the following examples; then contact your Carboloy representative, or Authorized Carboloy Distributor, for information on Carboloy *job-graded* carbides for your specific operation. Take advantage of *better profits through better tooling.* Call today, or write: *Metallurgical Products Department of General Electric Company, 11141 E. 8 Mile Street, Detroit 32, Michigan.*

*Carbides in 78 Series are all pre-honed. Carbides in the 300 series are available pre-honed, precision-ground, or utility-ground.

HEAVY-DUTY MACHINING

Photograph A shows the Carboloy 370 Grade insert after the run. Wear land was only .012", and there is no deformation (upsetting) of the cutting edge. Photo B shows the 78B Grade insert after the same run. Note the deformation of the cutting edge . . . Grade 78B was not designed for such severe cutting pressures.

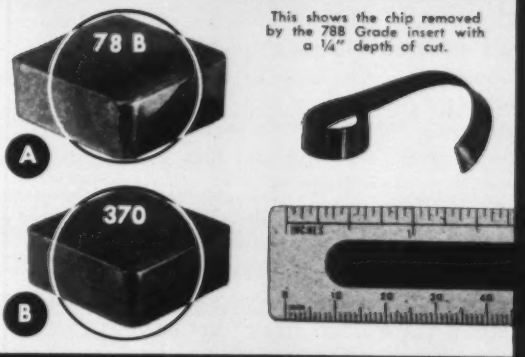
CONCLUSION: *In this heavy-duty application, Carboloy 370 Grade is recommended.*



LIGHT-DUTY MACHINING

In this light-roughing application there is little visible difference between the Carboloy 78B Grade insert (Photo A) and the 370 Grade insert (Photo B). Because 78B Grade is job-graded for light- and medium-roughing applications, it will wear as long as 370 Grade. Grade 78B insert is lower in initial cost, so in this case it makes good sense to use Grade 78B. In this example, the wear land on 78B insert was only .010".

CONCLUSION: *In this normal steel-cutting application, Carboloy 78B Grade is recommended.*



CARBOLOY® CEMENTED CARBIDES

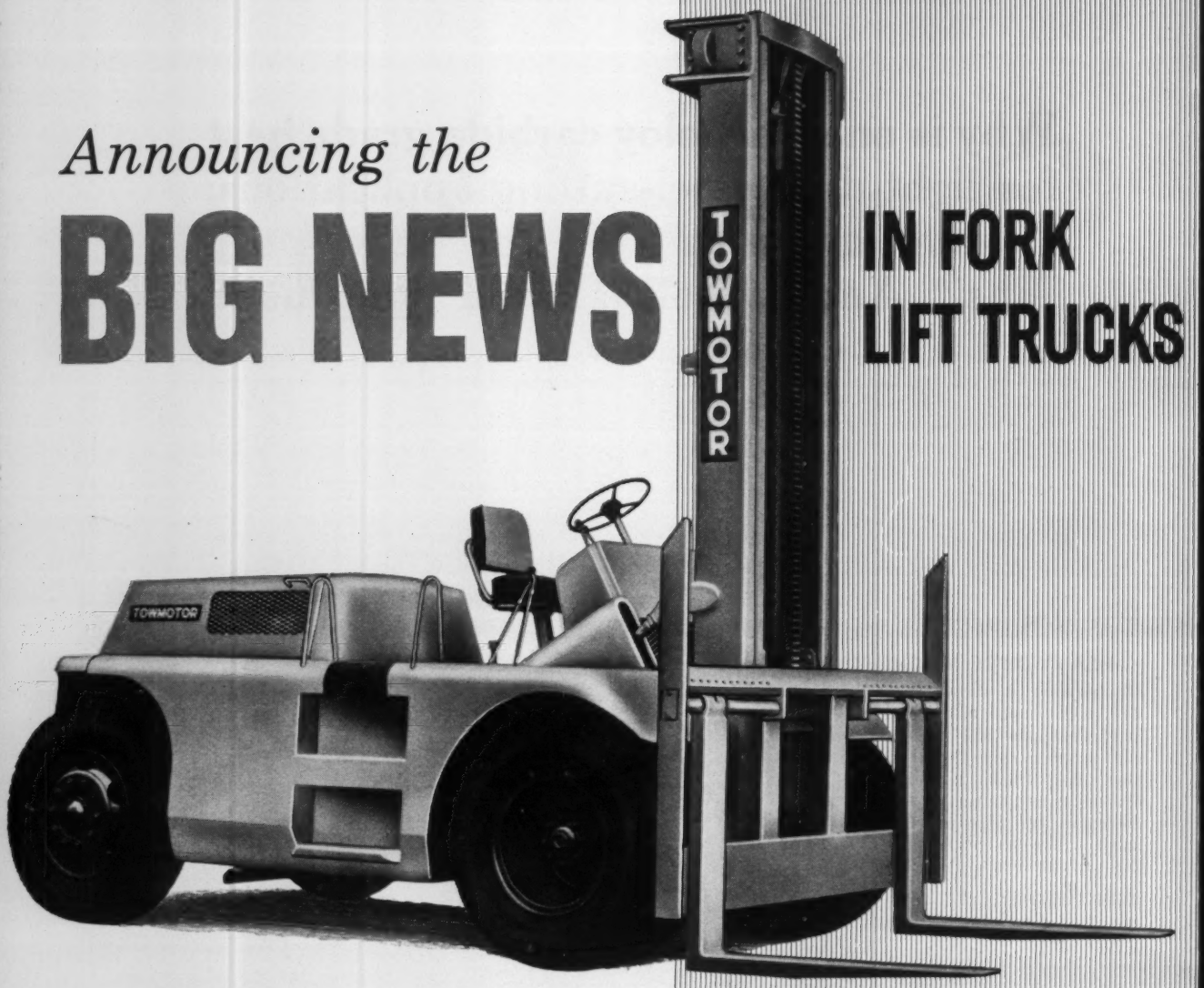
METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

Announcing the

BIG NEWS IN FORK LIFT TRUCKS



If you unload, move, stack and load heavy materials be sure to get information on the new big-capacity Towmotor "Monarch" Series Fork Lift Trucks. They're as new . . . all-new . . . as they look!

All eight of the new "Monarch" Series models are built to handle your roughest and toughest jobs . . . yet they are easy to handle . . . and feature—

- New High-Traction "Low Profile" Styling
- New Extra-Visibility Mast Design
- New Equalized Weight Distribution
- New "Unitized" Frame and Body Construction
- New Fingertip Control for Easy Operation

They all include many more engineering "firsts" described in new Towmotor "Monarch" Series bulletins covering models with 5 to 12 ton load capacities. For specifications, write Gerlinger Carrier Co., Dallas, Oregon.

TOWMOTOR

"MONARCH"

AN ALL-NEW SERIES OF HEAVY DUTY FORK LIFT TRUCKS BY

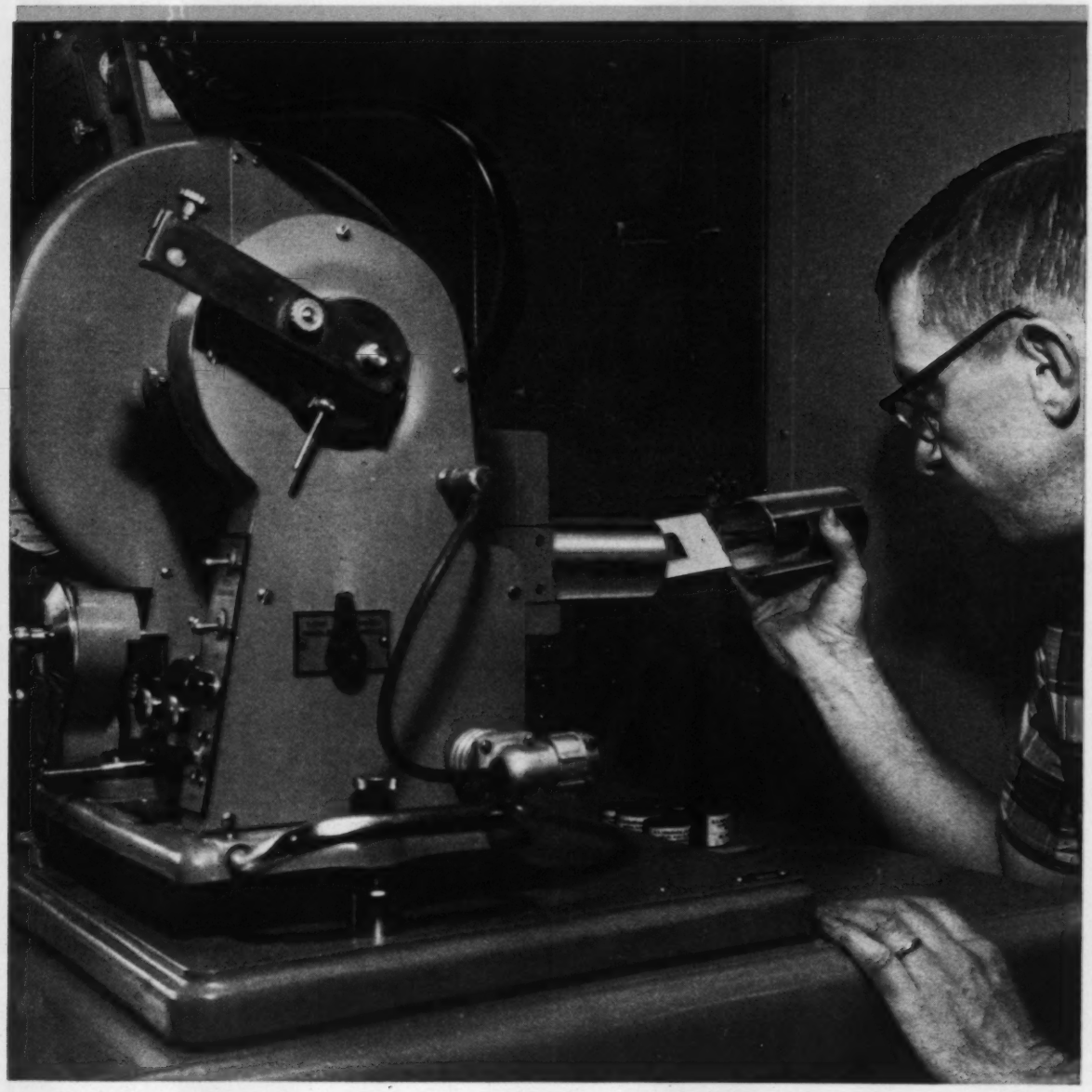
TOWMOTOR THE ONE MAN GANG ® -GERLINGER

Gerlinger Carrier Co., Dallas, Oregon, is a subsidiary of Towmotor Corporation

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

Laboratory facilities at Standard have kept well in step with the revolutionary advances which have been made in the field of metallurgy during the past decade. Plant facilities, too, are geared to produce even the most exotic of special alloys which today's industry demands.

And Standard's famed personalized service means that your most difficult problems can be resolved by our metallurgists and engineers and assures a finished product which meets your most exacting requirements, delivered in record time. Write today for the illustrated booklet, "Quality Control at Standard."



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Rings • Shafts • Car wheels • Gear blanks • Flanges • Special shapes

SCOTCH
BRAND

TAPEnology... industry's newest cost-cutting tool

TAPE BUNDLES "AWKWARD" MATERIALS FOR EASY SHIPPING OR STORING

V-Crimp or corrugated roof and siding material sheets are bundled quickly and easily with "SCOTCH" BRAND Filament Tape. On in seconds—tape conforms to irregular surfaces. Makes nesting or stacking difficult materials easy.

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"SCOTCH" Filament Tape is super-strong . . . amazingly shock-resistant. Even short strips do the job. Thousands of embedded filaments act like tiny muscles to give up to 500 lbs. of tensile strength per inch of width.

What's your shipping problem? "SCOTCH" BRAND Filament Tape offers dozens of time-saving, labor-saving, and dollar-saving shortcuts. Holding, bundling, carton-reinforcing, unitizing . . . chances are your 3M Representative can show you how to save with "SCOTCH" BRAND. Ask your "SCOTCH" BRAND Tape Distributor for information, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn., Dept. IAU-120.

When tape costs so little, why take less than "SCOTCH" Brand?

"SCOTCH" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN. EXPORT: 99 PARK AVE., NEW YORK 16. CANADA: LONDON, ONTARIO.

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STEELMAKING AT JESSOP

Experience counts . . . and Jessop has it

There is no substitute for experience in making steel for the reactors of nuclear submarines like the Nautilus, the Skate and the Polaris-firing George Washington. Jessop's activity in nucleonics dates back to the early days of the Manhattan Project.

Today, Jessop's still at it—continuing research, improving techniques, piling up experience in making sophisticated steels to harness the atom. And Jessop is out front in other steelmaking fields too.

Whether you use heat- or corrosion-resistant stainless steels; abrasion- or shock-resistant steels; nonmagnetic or precision ground steels; high speed, cast-to-shape, clad or alloy steels, you can be sure of the quality—and *service*—you'll get when you do business with Jessop.

In quality steelmaking experience counts, and Jessop has it. Call a Jessop sales office in any of 23 major cities of North America and discuss *your* needs for specialty and alloy steels.

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Plants and Service Centers:
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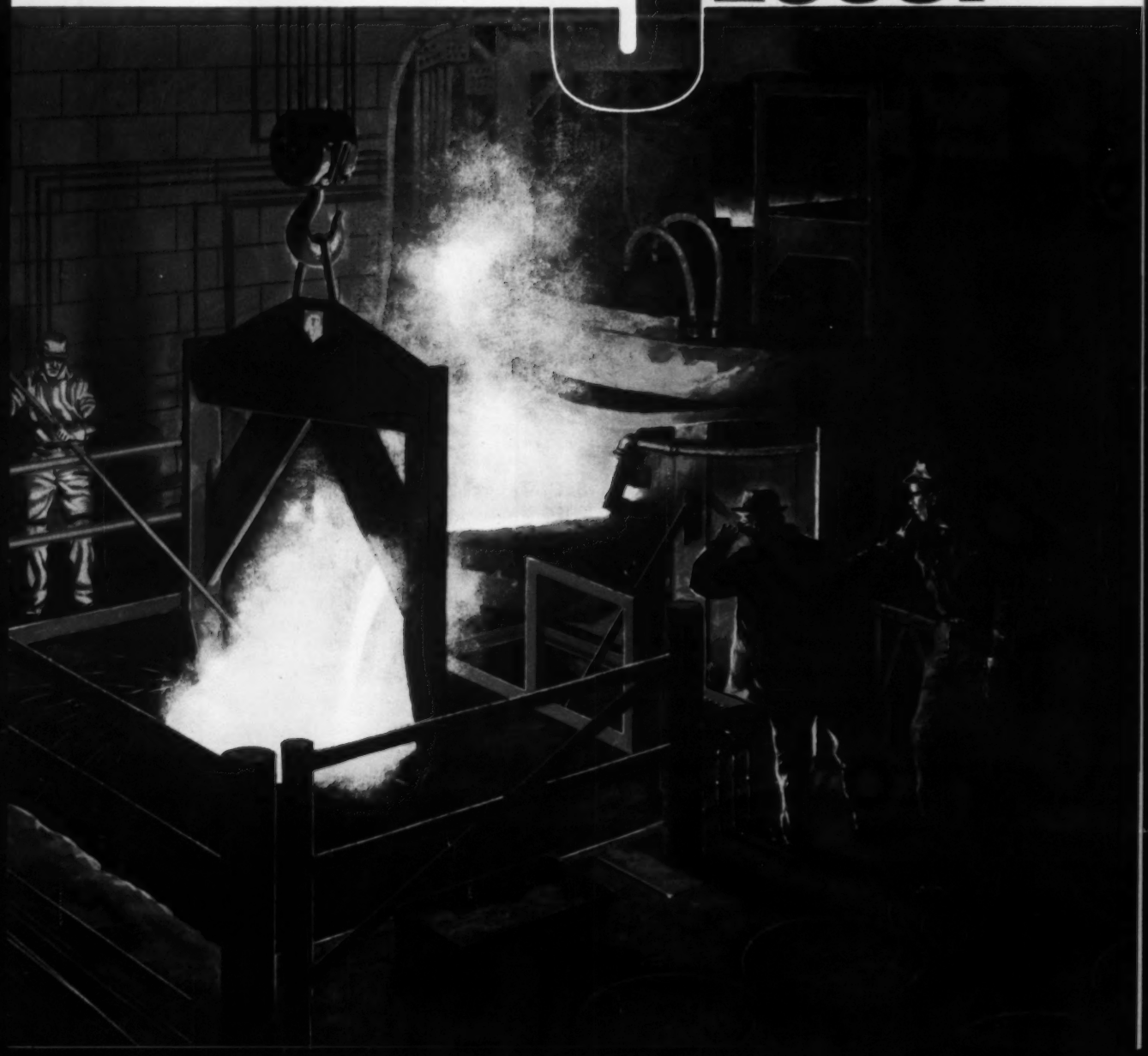
JESSOP



Flash butt-welded ring from extruded material slashes away 64 lbs. of stainless 310

Only 1/3 as much material was required when a special extruded section was substituted for bulky bar stock in this flash butt-welded ring. By leaving 2/3 of the material at the mill, instead of hogging it out, Amweld saved its customer $76.83 per ring—plus hours of expensive machining. (Savings compared to the forgings originally used are even greater.)

Amweld is equipped to supply flash butt-welded rings and circular products in stainless, titanium, aluminum, as well as a wide variety of corrosion-resistant alloys. If you would like to know more about Amweld's welding, fabricating and complete machining facilities, phone or write.

GET THE FACTS ABOUT AMWELD

New 20-page catalog describes flash butt-welded rings and circular products manufactured by Amweld. Also booklet entitled, "How Flash Butt-Welded Rings are Made."

AMWELD® INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MFG. CO. • 110 DIETZ ROAD • WARREN, OHIO

STEEL
The Metalworking Weekly

Metalworking Week®

December 19, 1960

New Economic Barometer of Steel Operations Devised

Effective Jan. 1, the steel industry will discontinue releasing its weekly operating rates related to capacity. Reason given by American Iron & Steel Institute: Percentage of capacity operations is unrealistic as a measure of the industry's economic activity. In their place, weekly statistics of the tonnage of ingots and castings produced in the previous week, the tonnage of the next preceding week, and the percentage gain or loss will be given. In addition, tonnages for the year to date in the current year, and the previous year for the same period, together with percentage gain or loss, will be issued. A new production index has been devised based on average weekly production for the 1957-59 period, as well as indexes for each of the 11 steelmaking districts.

Profits, Sales Decline; Margins Narrow

Manufacturers' after tax profits declined in the third quarter to $3.6 billion (vs. $4.1 billion in the second quarter and $3.8 billion in 1959's third period), the Federal Trade Commission reports. Manufacturers' sales fell 4 per cent to $84.9 billion but remained higher than in 1959's strike-hampered third quarter. Profit margins fell to the lowest level in more than two years. After tax profits averaged 4.3 cents per dollar of sales in the third quarter—vs. 4.6 cents in the prior quarter. The annual rate of return on stockholders' equity dropped to 8.7 per cent in the September period vs. 9.9 per cent the previous quarter and 9.6 per cent in the third quarter of last year. Here's the metalworking breakdown (in billions of dollars):

	Sales		After tax Profits		% Profit to Sales	
	3rd Q	2nd Q	3rd Q	2nd Q	3rd Q	2nd Q
Motor vehicles & parts	$5.5	$7.7	$0.19	$0.50	3.5	6.5
Aircraft & parts	3.1	3.3	0.04	0.05	1.3	1.4
Electrical equipment	7.1	7.3	0.25	0.27	3.5	3.6
Nonelectrical equipment	6.3	7.0	0.23	0.32	3.7	4.6
Fabricated metal products	4.4	4.3	0.13	0.12	3.0	2.9
Primary iron & steel	4.1	4.9	0.13	0.26	3.2	5.3
Primary nonferrous metals	2.2	2.3	0.12	0.14	5.2	6.0
Furniture & fixtures	1.1	1.1	0.03	0.02	2.6	1.9
Instruments, related products	1.3	1.3	0.08	0.08	6.1	6.1

Prof Sees 'Milder' Recession

Expect the current recession to be "somewhat milder" than that of 1958, asserts Prof. Paul W. McCracken of the University of Michigan. He lists five reasons why we shouldn't run for the storm cellar: 1. Capital expenditures won't be cut back as severely as they were in 1958. 2. Retail sales look "somewhat better." 3. New car buying continues "quite strong." 4. Consumer confidence shows no sharp deterioration. 5. No "air pocket" in defense orders will jolt the economy.

Economist Sees Depression Possibilities

"The 1960 recession has been gathering momentum—in the U. S. and abroad —at a rate and on a scale threatening to explode into a depression," contends

Technical Outlook—Page 105 Market Outlook—Page 141

Eliot Janeway, president, Janeway Research Corp., New York. He lists four trouble spots: 1. The glutted market for homes. 2. A possible further decline in steel operations coupled with pressure on prices. 3. Continued distress in oil, including more dumping by Russia. 4. The retailing section is following business buying into the recession.

Three Executives Look at 1961

J. L. Block

E. N. Cole

R. S. Ingersoll

At First National Bank of Chicago's panel discussion on the business outlook, these comments were made: Expect passenger car sales in 1961 to be between 6.7 million and 7 million units, including 450,000 to 500,000 imports. —Edward N. Cole, GM vice president and general manager of Chevrolet Div. . . . "A rather mixed trend" indicates "some betterment in the consumption of steel." That, plus an early end to the inventory liquidation, should improve steel production in the first six months of next year over the last half of this year.—Joseph L. Block, chairman, Inland Steel Co. . . . "Although household appliance volume for 1961 should be equal to that of 1960 or exceed it by 1 or 2 per cent, the first six months will be the weaker half of the year."—Robert S. Ingersoll, president, Borg-Warner Corp.

Grand Jury Indicts Ten Firms

A Buffalo grand jury has returned three indictments charging ten makers of metal furniture with a conspiracy to fix prices or eliminate competition. The Justice Department alleges that the firms made "illegal agreements to use a uniform zone delivered pricing system with artificial zone boundaries, and agreements to fix the consumer prices for metal desks, tables, and filing cabinets."

Wheeling's Steele Points Up Need for Efficiency

William A. Steele, president, Wheeling Steel Corp., asserts: "We must learn how to reduce the number of manhours required to make a ton of steel. Man for man—whitecollar as well as bluecollar—foreign workers are now producing more than American workers. Individual human efficiency abroad has become greater than ours. In recent years, our national temperament has seemingly grown more tolerant of featherbedding and make-work practices. Tolerance is a virtue, but this is a kind of tolerance our nation can no longer afford."

Youngstown Sheet & Tube Looks to Europe

Youngstown Sheet & Tube Co. is considering investing in European steel facilities but has made no decision yet, A. S. Glossbrenner, president, told the Youngstown Chamber of Commerce. Rumor has it that the firm is considering a joint venture with French and Belgian firms to build a fully integrated mill on the Ghent Canal in Belgium. Mr. Glossbrenner also predicted relatively low steel production in 1961's first half, with an upturn coming late in the second quarter or early in the third.

Private R&D Outlays Exceed $10 Billion

Private industry is spending more than $10 billion for research and development this year, a survey by National Science Foundation indicates. That compares with $9.4 billion spent last year, which was 15 per cent greater than the 1958 level. In 1959, manufacturers of aircraft and parts spent about $3 billion on R&D; electrical equipment makers spent about $2.2 billion. Machinery makers spent $910 million. About 57 per cent of the industrial R&D funds came from the federal government.

New Cable to Bring Tomorrow's Homemaker More Kilowatts

This little lady shows a mammoth aluminum cable being touted as one solution to the problem of getting more kilowatts of electrical energy to tomorrow's homemaker. Designed by Aluminum Co. of America, it's being used in General Electric Co.'s "Project EHV," a prototype transmission system now operating near Pittsfield, Mass. The system is carrying 750,000 volts—making the U. S. the world leader in extra-high-voltage power transmission. Russia has an experimental line carrying 600,000 volts.

New York Utilities Pit Opposing Nuclear Concepts

Seven New York state utilities have asked General Electric Co. and General Dynamics Corp. to develop two, competing, atomic powerplant concepts. GE will dwell on its nuclear superheat concept and General Dynamics will continue developing its high temperature, gas cooled, reactor concept. The utilities want to learn which will be more competitive with conventional power sources. If either proves competitive, the utilities plan an atomic powerplant in New York state by 1968. Capacity would be 300,000 to 500,000 kilowatts.

Uranium Steel Developed

The Canadian government has developed a new uranium steel that's now available to the steel industry. A government minister says 1 lb of uranium per ton of steel increases strength, improves corrosion resistance, and boosts

high temperature properties. Larger amounts of uranium are needed to give tool steels improved corrosion resistance.

Mobot Replaces Man in Hot Spots

Mobot Mark II, a mobile robot built by Hughes Aircraft Co., demonstrates its almost human actions by closing its arms around Colleen Adams. The remotely controlled handling machine was designed to work in areas too dangerous for man, including "hot" radiation labs. Mobot's 6 ft arms are double-jointed at shoulder, elbow, and wrist. Its TV-camera eyes transmit photos of its performance to a human console operator.

Straws in the Wind

Manufacturers expect a 4 per cent increase in factory sales of home laundry appliances next year, the American Home Laundry Manufacturers' Association reports . . . Expect world rubber consumption (exclusive of Iron Curtain synthetic rubber) to reach a record 3.8 million long tons in 1961—up 1 per cent from the '60 mark, says J. W. Keener, president, B. F. Goodrich Co. . . . Valk Mfg. Co. is producing snowplows at the rate of 1000 a year in Alabama . . . Under a Navy contract, Vitro Corp. of America will establish a yardstick for predicting how often, percentagewise, a missile system will fail to perform acceptably under specified conditions—from launch to target . . . Unemployment in mid-November exceeded 4 million . . . Hotpoint Div., General Electric Co., has spent $8 million to redesign and retool its '61 appliance line . . . October exports rose 8 per cent above the September level to $1.74 billion, while imports held at the September level—$1.16 billion, the Commerce Department reports. Metalworking exports rose around 6 per cent, while metalworking imports rose about 3 per cent . . . The Miscellaneous Workers Union has organized 250 Santa Clauses in Sydney, Australia, hopes to get them a $5 raise.

Metalworking Pulse

The Business Trend: A strong seasonal rise in output of electricity was mainly responsible for the 2 point advance of STEEL's industrial production index to a preliminary 150 (1947-49=100). **Autos:** Little evidence of softness is seen in production, although most Saturday scheduling has been eliminated. **Steel:** For the last four weeks, production has maintained a pace equivalent to only 72,250,000 tons on an annual basis. Estimated production for 1960: 99.3 million tons.

- **INDUSTRIAL PRODUCTION**
  - Week ended Dec. 10 . . . . **150†**
  - Year ago **173**
  - Details on Page 91
- **PASSENGER CAR PRODUCTION**
  - Week ended Dec. 17 . . **135,000***
  - Year ago **152,449**
  - Details on Page 88
- **INGOT PRODUCTION RATE**
  - Week ended Dec. 18 . . **48.7%†**
  - Week ago **49.0%**
  - Details on Page 150

†Preliminary. *Estimated.

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From ten-yard pipe to ten thousand valves Hevi-Duty matches the furnace to your requirements

Whether you process 30-ft castings or thousands of small parts . . . whether you use fuel-fired or electric heat . . . automatic or batch handling, the correct combination can be supplied by Hevi-Duty.

Hevi-Duty offers a wide selection of furnaces, each one carefully engineered to hold close tolerances . . . to turn out uniformly high-quality products day after day, year after year.

If you have a heat-processing problem, why not call in a Hevi-Duty sales engineer? We are almost certain he can help you, for he is much more than an order taker. He is a consultant— qualified to recommend entire heat-processing systems and backed by a company that can quickly adapt the equipment to fit your needs exactly.

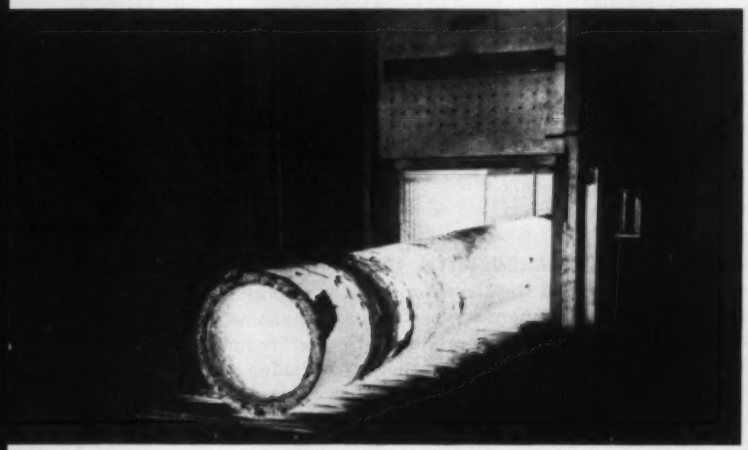
HEVI-DUTY

Electric and Fuel-Fired Industrial Furnaces and Ovens

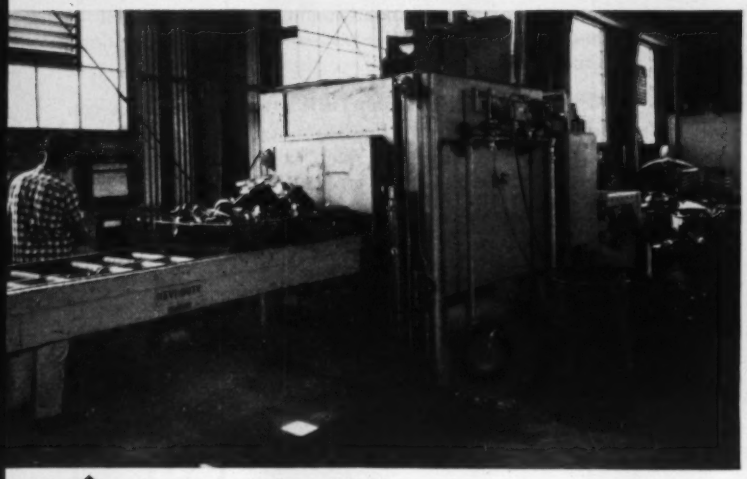
B P C

A Division of Basic Products Corporation

Hevi-Duty Electric Company, Watertown, Wis.



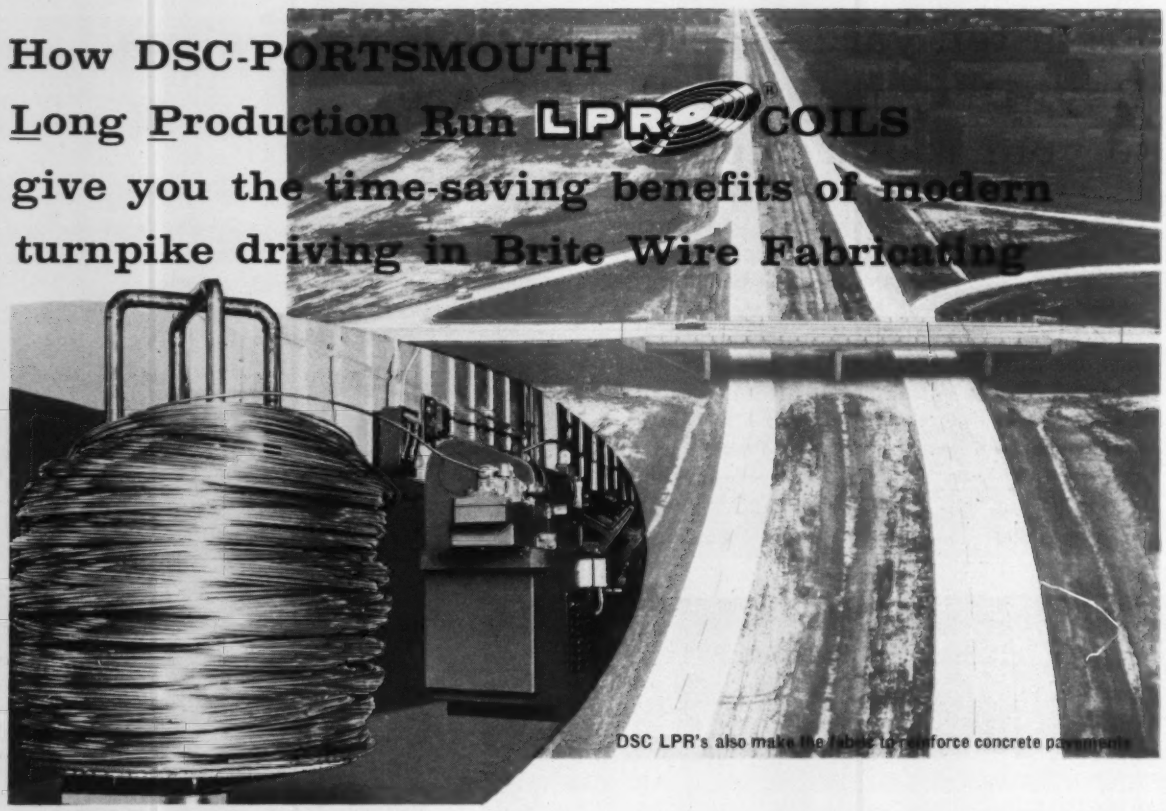
◀ Sandusky Foundry and Machine Company, Sandusky, Ohio, uses this Hevi-Duty car-bottom furnace to heat-treat castings up to 54 inches in diameter and 30 feet in length. Heating elements located in both ends, and in the car bottom, plus three fans, produce a degree of temperature uniformity generally expected only in smaller units. **For complete information, write for Bulletin 644R.**



▲ Pacific Steel Casting Company, San Francisco, California, is pleased with the operation of this Hevi-Duty Clean-Line Furnace. It heats, holds at the correct temperature for the prescribed period, transfers each load to the cooling chamber, and discharges baskets of castings automatically. A retractor on the unload table enables the Clean-Line Furnace to process four baskets without manual handling or supervision. Heat-treated castings come out ready for shipping without further attention. **For complete information on this, write for Bulletin D-100A.**

▲ Eaton Manufacturing Company's Valve Division really proves the ability of Hevi-Duty pit furnaces to maintain uniformity. They process dense 2,000-lb charges of valves — 10,000 to a load — all free from distortion, all uniformly hard . . . no rejects. An efficient fan and baffle system provides an even rate of heating throughout the dense load and contributes to over-all uniformity. **For complete information, send for Bulletin 646A.**

How DSC-PORTSMOUTH Long Production Run LPR® COILS give you the time-saving benefits of modern turnpike driving in Brite Wire Fabricating



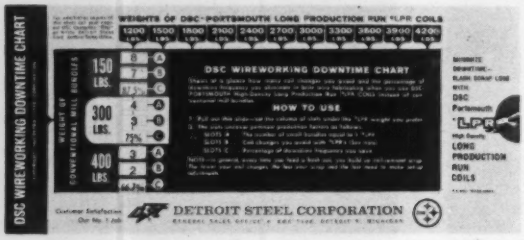
THIS PICTURE WAS TAKEN IN A CUSTOMER'S PLANT. It shows a Straightening and Cutting setup while feeding an average of 2055 lbs. of 5/16" round brite wire per coil. This job keeps running for 1½ miles without slowing down or stopping for coil changes or setup adjustments.

HIGH-DENSITY (high weight per cu. ft.) LPR's come in free-standing coils that weigh from 1000 to 4200 lbs., depending on your wire gauge. One customer, for example, orders 10 ga. coils averaging 2210 lbs. for more than 8 miles of non-stop fabricating. In fact, LPR's can give you up to about 40 miles of brite wire fabricating with time-saving benefits akin to those in turnpike driving.

COMPARED WITH TRADITIONAL MILL BUNDLES—besides the Downtime you save with LPR's you slash coil-remnant scrap in virtually the same ratio. RESULT: you increase productivity and reduce material and manhour costs . . . thereby widening your manufacturing margin, bolstering your competitive position.

MORE LPR BENEFITS: You conserve coil storage space, reduce over-all material handling time and expense, improve inventory management, and rid yourself of small coil racks and the bother of caring for vendors' returnable carriers.

FOR DETAILED INFORMATION about how LPR's can help *you* save wireworking time and money, call your nearest DSC customer "Rep" or write *Detroit Steel Corporation, Box 7508, Detroit 9, Mich.*


DSC WIREWORKING DOWNTIME CHART
WEIGHTS OF DSC-PORTSMOUTH LONG PRODUCTION RUN "LPR" COILS
1200 1500 1800 2100 2400 2700 3000 3300 3600 3900 4200 LBS.
CONVENTIONAL MILL BUNDLES
150 LBS.
300 LBS.
400 LBS.
DSC WIREWORKING DOWNTIME CHART
HOW TO USE
DSC Portsmouth "LPR" High Density LONG PRODUCTION RUN COILS
DETROIT STEEL CORPORATION

FREE—Get your copy of DSC's Wireworking DOWNTIME SLIDE CHART—a novel device for quickly "figuring" your potential savings with LPR's. Write Detroit Steel Corporation, Box 7508 (Room 311), Detroit 9, Michigan.

Happy Holidays to All

Customer "REP" Offices in Principal Cities

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Performance Proved DSC®

DETROIT STEEL

Flat Rolled and Wire Products

Detroit Steel Corporation—General Sales Office: Box 7508, Detroit 9, Mich.

Mr. Goldberg and Labor

In speaking before the National Association of Manufacturers in New York, Arthur J. Goldberg, general counsel, United Steelworkers of America, said:

"The challenge of the sixties is to end the 'cold war' between labor and management in America."

As Mr. Goldberg analyzes the "cold war," 20 years of collective bargaining have not resulted in mature, labor-management relations.

In striving for better understanding and good will, labor and management seem to be retrogressing rather than progressing, he said.

Management is tougher and so are the unions.

As a means of getting the two powerful groups to bury the hatchet, Mr. Goldberg proposes the establishment of a tripartite National Council of Labor-Management Advisers, representing labor, management, and the public.

The council would incorporate the Business Advisory Council of the Department of Commerce and advisers to the Department of Labor.

As adviser to the President, the council would recommend "bold and imaginative programs to encourage the nation's economic growth and health."

It would formulate programs for management and labor to follow in advancing industrial peace and minimizing industrial conflict.

It would handle national emergency disputes, in lieu of present Taft-Hartley procedures.

Mr. Goldberg says his proposal has the endorsement of Chairman Charles Cox of the Kennecott Copper Corp. But he says it is branded as a "seductive device" by Vice President Heath Larry of the U. S. Steel Corp.

We do not intend to take either side in discussing Mr. Goldberg's proposal.

But we do wish to point out that he has the germ of an idea that should be explored.

None of the "cold war" problems of wage-price inflation, foreign competition, jobs, and defense against Communism can be solved by either side alone.

Labor and management are in the same boat.

Irwin H. Such

EDITOR-IN-CHIEF

NEW . . . LODGE & SHIPLEY 2516 • 2516-21

SUPERTURN

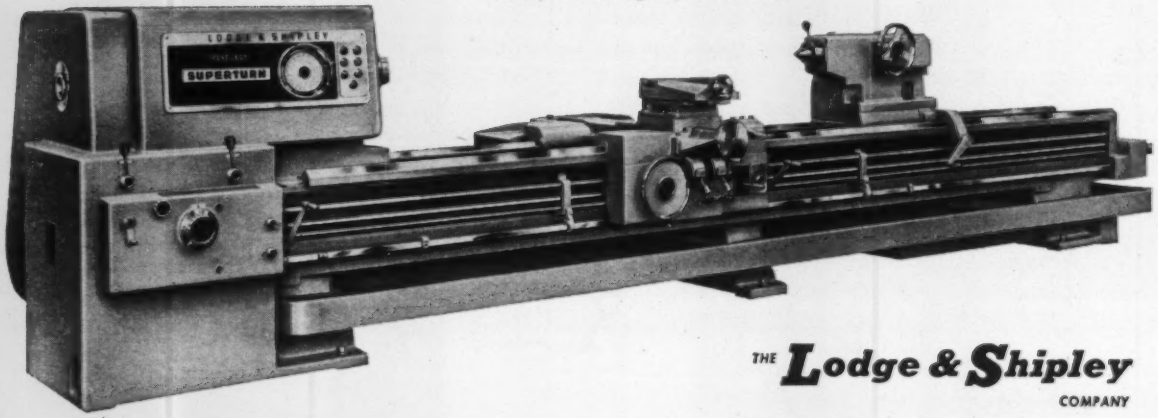
BIG JOB

LATHE WITH HORSEPOWER TO SPARE!

FULL 60 HORSEPOWER . . . 32 SPEEDS, POWERSHIFT "PRESELECTOR" . . . SWINGS 28" OVER BED

If you're looking for "big job" turning ability . . . capacity to turn a 16" diameter shaft, for example . . . with super accuracy, speed and convenience . . . this is it! Important too, is the fact that the SUPERTURN Lathe is designed for present and future turning techniques . . . ideal for ceramic tooling, for ever-increasing cut and horsepower requirements!

A full listing of SUPERTURN features and advantages is impossible in this limited space. The SUPERTURN is big, rugged, yet . . . with the Powershift Preselect Headstock and 4-Way Power Rapid Traverse . . . amazingly fast and easy to operate. Lodge & Shipley confidently invites comparison with any other 2516 lathe. May we give you details on how the SUPERTURN fits into your turning requirements?



THE Lodge & Shipley COMPANY

3070 COLERAIN AVE. CINCINNATI 23,

put the small jobs on a

Lodge & Shipley 24" SPEED SHEAR

"Match the job to the equipment" . . . a simple rule for doing it faster and at lower cost . . . means you also free heavy duty shears for the jobs they do so well!

Particularly designed for fast cutting of small pieces, up to ⅛" x 24" mild steel, the Lodge & Shipley 24" Speed Shear is production proved for . . .

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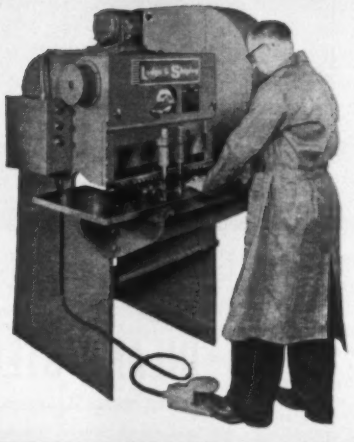

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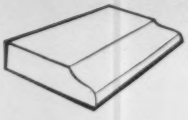

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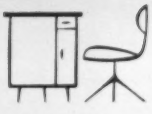

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Government's Gold Flow Action . . .

Will It Hinder Overseas Activities?

METALWORKERS are concerned about what the government's approach to solving the gold flow problem will do to their overseas business.

1. The Commerce Department has set in motion machinery to help U. S. firms speed up exports and to improve foreign public relations of U. S. industry.

2. The Treasury Department made some moves that damage foreign public relations and discourage U. S. firms investing abroad.

In its hectic attempts to improve the balance of payments problem, the government has taken these steps:

• Treasury Secretary Robert Anderson suggested to Henry Ford II that Ford Motor Co. not use dollars to buy the outstanding shares in its British subsidiary, Ford Motor Co. Ltd. He has told Mr. Ford that the expenditure of $358 million would have a serious impact on our balance of payments problem. Metalworking men fear that the move may signal active government pressure to dissuade U. S. companies from investing in foreign facilities.

• The Treasury Department has adopted a new set of rules requiring U. S. firms with foreign investments to give detailed reports of their foreign operations—a procedure that will force U. S. firms to employ brigades of clerks and accountants to fill out forms.

• Secretary Anderson, in his visit to West Germany, insisted that the Germans bow to his wishes. He failed to give adequate consideration to their counteroffers. Result: In the words of an official of one U. S. company with wide international interest: "The U. S. lost face in Europe and in other areas. That damages the position of the U. S. company operating abroad. It also created more apprehension in some areas about the strength of the dollar and could lead to the conversion of more dollars into gold, a result that would be directly opposite to what Mr. Anderson set out to accomplish."

Many executives note that Mr. Anderson's objectives—long term alleviation, not the one-shot type of assistance the Germans offered—were good. They criticize his approach—failure to show up at briefing sessions, disregard for advice rendered by U. S. diplomats in Germany, failure to keep the State Department fully informed on his plans, failure to give proper weight to the fact that he represented a lame duck administration.

• **Other Suggestions**—In and out of government, others have proposed additional methods of attacking the balance of payments problem that can spell trouble for metalworking. Among the proposals:

• Limit amounts that U. S. tourists can spend abroad. The approach would work hardships on executives of U. S. firms making extended trips to their foreign operations.

• Appeal strongly to U. S. firms to "Ship American"—transport goods to and from foreign ports in ships flying the U. S. flag. In many cases, this approach would cost more due to wages and union regulations.

• **The Plusses**—On the credit side, metalworkers point to these favorable moves President Eisenhower has made:

• He has caused the International Cooperation Administration (a U. S. foreign aid agency using public funds), the military services, and some other federal agencies to adopt a "Buy American" program. They will "place primary emphasis" on the financing and purchase of U. S. goods.

• He has asked the secretary of state to push harder for tariff concessions from foreign countries, so that U. S. exports might flow more freely.

• He has called for a program to encourage foreigners to travel in the U. S.

• He has asked the Development Loan Fund (which provides foreign

Kennedy Will Inherit the Problem

In just one month, President-elect Kennedy will inherit the balance of payments problem. Businessmen are wondering what path he is likely to take. He has not outlined a program, but his campaign speeches, voting record, and recent actions give some indication that he might place more emphasis on measures aimed at increasing the flow of capital into this country than on actions to reduce the capital outflow.

In his campaign, he suggested a stepped-up program to increase U. S. exports. He also called for more efficiency in government branches abroad. And he mentioned the urgency of convincing importing countries to liberalize their restrictions against U. S. goods and services.

Mr. Kennedy has also pledged a balanced federal budget (which would prop up confidence in the U. S. as a monetary manager), but it will be impossible to balance the fiscal 1961 budget if we have a prolonged recession. And if some of Mr. Kennedy's domestic programs are enacted, a deficit is also expected in fiscal 1962.

Gov. Luther Hodges, who will be Mr. Kennedy's commerce secretary, generally favors most of the recent steps taken by the Eisenhower Administration. But he adds another step: Actively encourage more foreign investment in this country.

development loans with public funds) to continue to place primary emphasis on the financing of U. S. goods.

• **Dollar Drain**—In the last three years, the U. S. has sent abroad $10 billion more money than foreign countries have sent to the U. S. Our exports have exceeded our imports consistently—although last year our net surplus was only $1 billion. This year, we'll export around $4 billion more goods than we'll import.

But our trade surplus is far too small to offset the huge volume of dollars that flows abroad in other forms—including military assistance; economic assistance; private, long term, investments; acquisition of short term assets; and tourism. About $8.5 billion will flow abroad in those forms this year. Result: The U. S. will have a balance-of-payments deficit of $4 billion to $4.5 billion this year.

Foreign claims against the dollar (most of them immediately transferable into gold) now exceed $22 billion. Our gold reserve is now below $18 billion. The result is a weakening dollar. It has already fallen to a discount position in many foreign monetary capitals. And concern that the dollar will be devalued is expressed in many quarters abroad. So there is a flight from the dollar into gold—at the rate of around $50 million a week.

• **Gold Drain**—Since 1949, we have lost $6.6 billion in gold, while Germany has gained $2.9 billion; Italy, $1.75 billion; the United Kingdom, $1.4 billion; Holland, $1.2 billion; and France, $1.1 billion.

• **Steps to Take**—How can we improve our balance-of-payments position without placing restrictions on U. S. industry's ability to use its capital in the most productive manner? STEEL posed that question to numerous authorities last week. Here are some suggested steps:

• **Foreign Investment**—Said one president: "The government had no call to intervene in the Ford deal. Ford's timing may have been wrong, but the situation the dollar finds itself in was anticipated some time back. Action should have been taken sooner. We would feel unkindly toward any government move to limit overseas investment—if it should happen, we and others in our position would pursue and employ other appropriately timed means to make investments in other currencies."

S. J. Rundt, New York consultant on international business, asserted: "There is nothing wrong with private American capital venturing abroad for productive purposes. Such a move benefits us as a nation, benefits the host countries, and renders legitimate profits to those who would shoulder greater risks overseas. To curb the outflow of private capital would be protectionism at its worst—and would perpetuate the reliance of underdeveloped nations upon official funds from the U. S. taxpayers' till. It is hoped that more positive steps will be taken (to improve our position) rather than negative, restrictive ones."

One step suggested by Mr. Rundt: Revision of our tax structure to encourage U. S. firms to bring profits earned abroad back into this country. Paul D. Seghers, New York authority on international taxation, suggests that "the national interest would be best served by: 1. No tax on business income of U. S. corporations earned (and already taxed) abroad. 2. Tax incentives for exports of goods made in the U. S." Mr. Rundt suggests "a super-Boggs bill, designed to enable U. S. corporations to stay at home with their financial headquarters, rather than set up 'holdings' in Panama, Nassau, Bermuda, Luxembourg, Liechtenstein, and Switzerland (to escape for a while from the U. S. tax collector)."

The export manager of an Ohio metalworking firm with large foreign interests told STEEL: "This talk of discouraging U. S. investment abroad is a bad thing. We need the freedom to follow normal business channels. There are a hell of a lot of other things than can be done."

He suggests:

• **Insurance** — "The government should make it easier for exporters and investors to get insurance against political risks and exchange risks. To get insurance from the Export-Import Bank of Washington now, we must go through the same procedures as if we wanted direct credit assistance. There are some indications that Ex-Imbank will soon modify that rule."

• **Trade, Not Aid**—"There should be less direct foreign aid by the U. S. and more help to underdeveloped nations in loans. There has been a hell of a lot of waste in direct assistance.

"And the loans should be, in most cases, tied to the purchase of goods in this country."

• **Export Assistance** — Mr. Rundt suggests stepping up "special tax inducements for exports in furtherance of free capital flow in both directions." He suggests that the best solution to the problem lies in increasing capital inflow rather than reducing capital outflow. Among export encouragements suggested by various businessmen: 1. Assist with long term credit. 2. Make available to U. S. firms more information about foreign markets. 3. Arrange low cost financing of exports.

Steel Industry Payroll Hit $3.9 Billion in '60

The 1960 payroll for wage and salary employees of the U. S. iron and steel industry hit a record $3.9 billion, reports the American Iron & Steel Institute.

The previous high was $3.8 billion in 1957.

Institute officials point out that the average number of employees for the year was around 576,000, a decline of less than 8 per cent compared with 1957 although steel production is off 15 per cent.

NEW OFFICERS of the Material Handling Institute, Robert F. Moody, president (left), and B. E. Phillips, first vice president, report that in 1961 . . .

Handling Equipment Sales Will Hit $610 Million

MATERIAL handling equipment sales in 1961 will be as good or better than 1960's—in fact, it could be the industry's third best year, exceeded only by 1959 and 1956.

At the Material Handling Institute's annual meeting in New York last week, Robert F. Moody, general sales manager, Hyster Co., Portland, Oreg., and newly elected MHI president, backed up that optimistic forecast with this reasoning:

"More and more, industry is realizing that one way to reduce production costs and improve profits is through more efficient handling of incoming materials through processing shipment as finished products. For years, our industry has been demonstrating that more than 25 per cent of the cost of any product is in handling."

• **Breakdown**—Mr. Moody predicted 1961 sales of industrial trucks, conveyors, and other handling equipment would hit $610 million. Sales this year at $597 million are down from 1959's $632.9 million. In 1956, the industry chalked up sales of $713.5 million.

To acquaint industry with the latest material handling techniques, MHI will establish an idea center at its Cow Palace show in San Francisco, Feb. 22-24, 1961. Ideas from 15 major industries will be presented.

Profits of material handling equipment makers have been eroded by excessive price cutting. Most executives interviewed at the meeting expect to take a firmer position on prices with the advent of better business next spring.

Mr. Moody succeeds C. L. Fell, vice president-marketing, American Monorail Co., Cleveland. Other new officers are: First vice president, B. E. Phillips, general manager, Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.; second vice president, Norman A. Price, executive vice president, Colson Corp., Chicago.

Selected U. S. Metalworking

(MILLIONS OF DOLLARS)

REGION AND PRODUCTS	First half, 1960	1959	1958
TOTAL, 20 REPUBLICS			
Iron and steel mill products	74.7	118.0	186.1
Metal manufactures	54.2	136.5	183.9
Electrical apparatus	108.9	242.6	312.7
Industrial machinery	303.8	659.5	758.3
Automobiles, parts & accessories	232.9	416.1	451.5
Agricultural machinery and tractors	61.8	99.8	110.5
MEXICO			
Iron and steel mill products	18.5	13.7	37.4
Metal manufactures	9.4	21.5	24.3
Electrical apparatus	21.9	41.6	56.6
Industrial machinery	77.3	140.1	159.8
Automobiles, parts & accessories	60.0	100.6	113.8
Agricultural machinery and tractors	13.3	28.8	27.1
ARGENTINA			
Iron & steel mill products	6.1	11.9	15.7
Metal manufactures	3.0	4.3	6.1
Electrical apparatus	10.3	19.2	29.4
Industrial machinery	51.6	84.3	60.0
Automobiles, parts & accessories	29.2	28.5	29.3
Agricultural machinery & tractors	11.1	6.2	4.2
BRAZIL			
Iron & steel mill products	10.3	13.5	17.1
Metal manufactures	3.0	10.3	15.1
Electrical apparatus	16.3	30.1	36.7
Industrial machinery	42.2	118.4	140.7
Automobiles, parts & accessories	22.2	53.3	77.8
Agricultural machinery & tractors	6.6	6.7	21.3

Source: Department of Commerce.

FOREIGN ROUNDUP

LATIN AMERICA

This is the last in STEEL*'s annual foreign roundup series for 1960. Other articles covered Japan, Australia, and West Europe. For reprints write: Editorial Service,* STEEL*, Penton Bldg., Cleveland 13, Ohio.*

Competition Grows with Latin Market

LATIN AMERICA is a land of ferment—socially, politically, economically. It's a growing, exciting market that's important to U. S. businessmen—and challenging because it's frustrating at times.

Despite increased competition from Europe and Japan, which has made inroads on our share of the market, the U. S. supplied Latin America's 20 republics with $3.5 billion worth of imports (45 per cent of her total) last year. That was 22 per cent of our total exports.

• **Fast Growth** — Latin America's population, now just under 200 million, is increasing at an annual rate of 2.4 per cent compared with 2 per cent a year for China and India, 1.7 per cent for the U. S. and the world, and less than 1 per cent for Europe. By the end of the decade, experts predict the population (including the Caribbean area and dependencies) is likely to increase 30 per cent.

Gross national product (GNP) rose from $39.8 billion in 1950 to an estimated $70 billion this year. McCann-Erickson Inc., New York advertising firm, says national output will rise considerably above the $100 billion mark by 1970.

• **Offset by Problems**—But our Latin neighbors face many problems. Bouyant production trends in the world's industrial regions have had a relatively small effect on the prices of primary products, such as lead, zinc, tin, and agricultural commodities, upon which Latin America relies so heavily. So gains in foreign exchange earnings have depended largely on volume alone. As a result, the region has suffered from unfavorable trade terms created by global commodity gluts and low prices for primary products.

Other difficulties have arisen from political instability, inflation, imprudent public spending, ambitions not in accord with earnings, corruption, and petty rivalries.

Comments Robert L. Sammons, associate adviser, Division of International Finance, Board of Governors of the Federal Reserve System: "If Latin America can become an area of social and political stability, there will be greater

Exports to Top Latin Nations

REGION AND PRODUCTS	First half, 1960	1959	1958
CHILE			
Iron & steel mill products	3.0	8.3	6.9
Metal manufactures	2.9	4.9	7.7
Electrical apparatus	4.6	9.9	13.8
Industrial machinery	16.4	31.0	38.4
Automobiles, parts & accessories	16.9	14.9	10.6
Agricultural machinery & tractors	3.0	4.0	3.2
COLOMBIA			
Iron & steel mill products	6.9	10.9	10.0
Metal manufactures	3.6	6.8	7.6
Electrical apparatus	6.4	11.3	11.2
Industrial machinery	24.9	33.5	28.9
Automobiles, parts & accessories	28.0	35.7	18.5
Agricultural machinery & tractors	7.1	10.2	9.1

REGION AND PRODUCTS	First half, 1960	1959	1958
PERU			
Iron & steel mill products	4.3	5.7	9.2
Metal manufactures	2.4	4.8	11.6
Electrical apparatus	4.5	8.6	14.5
Industrial machinery	11.2	22.4	35.5
Automobiles, parts & accessories	10.5	16.1	19.4
Agricultural machinery & tractors	2.1	3.4	4.8
VENEZUELA			
Iron & steel mill products	12.7	33.3	55.0
Metal manufactures	16.7	48.5	58.8
Electrical apparatus	24.8	65.4	66.8
Industrial machinery	49.0	140.5	170.7
Automobiles, parts & accessories	38.7	103.3	104.9
Agricultural machinery & tractors	8.0	19.0	17.8

opportunities for both native and foreign businessmen than anything we have yet seen."

• **U. S. Shipments Slip** — While U. S. exports to Latin America have fallen since 1957, exports by principal European countries held fairly steady in 1958 and 1959, and have risen somewhat this year. Stronger showing of the Europeans is reflected in import gains in Argentina and Brazil. The U. S. has been losing sales in countries like Cuba and Venezuela.

As in other world markets, the European inroads have been a result of industry "coming of age," giving us stiff price, technical, and credit competition. Japanese manufacturers are improving their position too. Their share of the Latin market more than doubled last year, rising from 1.7 to 2.9 per cent of import sales.

Almost two-thirds of all Latin American purchases are made by Argentina, Brazil, Mexico, and Venezuela. Mr. Sammons says our future exports to the region will be determined by three factors:

1. The amount of exchange earned by Latin America from its exports to the rest of the world.

2. The amount of external capital, private and government, that moves into the area and whether or not such capital is tied to the purchases of the investing country's exports.

3. Our ability to compete, mainly with Europe and Japan, for the resulting business. Mr. Sammons believes that factor may turn out to be the decisive one.

Total U. S. exports fell last year, and shipments of metalworking goods followed the general pattern (see tables). But the downturn was countered in the first half of 1960 by construction, mining, and excavating equipment; agricultural machinery and tractors; automobiles, parts, and accessories; aircraft; and railway transportation equipment, which were ahead of the 1959 pace. Total exports, however, were up but $7000 over last year.

A factor which tends to limit export markets is that some countries close the border to imports or put up high tariff walls the moment a similar product is made domestically. Examples: Mexico and Brazil. Complaints have also been registered against the Export-Import Bank of Washington's reported refusal to grant some "political risk" coverage, and other financing difficulties have reduced exports to some areas.

• **Argentina** — Businessmen agree: "Peron wrecked the country." The economy, while showing advances, particularly in the farm and petroleum sectors, is still not recovering as fast as had been hoped. Industrial production is up from the low level of last year, though work stoppages continue to plague some industries. Progress has been made with monetary and fiscal reforms, but the situation is still regarded as a "mess."

As of last year, $200 million had been invested in Argentine industry since the rise of President Frondizi. The U. S. leads with $136 million. Germany, Italy, and Switzerland have also made substantial investments. Also helping the situation is the country's long established local manufacturing.

Last year, Argentina imported $984 million worth of goods, the U. S. share totaling $231 million. In the first half of this year, sales

by U. S. firms were well above that pace, equaling $156 million. Most metalworking categories shared in the upsurge.

• **Brazil**—The economists of this rich country could see no increase in world demand for coffee and cocoa, so the government decided to promote manufacturing. Emphasis is on heavy basic industry and Brazil is growing into the most industrial area in South America. Industrial production doubled in the last five years.

New plants and expansion are planned by Brazil's 13 steel producers. Output by 1965 will exceed that for all other Latin American nations. Nevertheless, demand will still exceed supply.

U. S. investments in Brazil are estimated at $839 million. Many of the 300 U. S. companies having Brazilian manufacturing affiliates are "blue chip" firms. German companies are active too.

Although U. S. exports continued to decline this year, good markets remain for power generating, refinery, chemical process, process control, paper processing, packaging, communication, and construction equipment, quality control instruments, clamshell buckets, high speed steel, heavy machine tools, and auto parts.

• **Mexico** — Despite a strong, diversified economy, Mexico relies heavily on foreign capital and knowhow. Observers feel Mexico will grow as a trading partner of the U. S., because of fast delivery and acceptance of U. S. goods.

Business conditions are not good. The mining industries are in the doldrums and the country has experienced a severe drought. However, a number of sources reported an upturn in October. Imports from the U. S. in the first seven months reached $442 million, slightly higher than the 1959 pace, but below 1958 levels.

• **Venezuela** — Political troubles, caused chiefly by Castro sympathizers, have created many question marks about Venezuela in the last few months. As a result, business has suffered and imports are down. Oil, Venezuela's lifeblood, has suffered from declining prices.

EDP Equipment

EDP—electronic data processing—means different things to different people. But ask anybody in the industry what it means marketwise, and you'll get substantial agreement that it will be one of the fastest growing industries of the sixties—even quicker than the parent electronic industry.

Just what the growth will be depends on who you ask. General Electric Co. sees about a threefold expansion (see table, Page 77). Officials of National Cash Register Co. would not be surprised if current volume more than tripled by 1970. Walter W. Finke, president of Electronic Data Processing Div. of Minneapolis-Honeywell Regulator Co., declares that sales will top $1 billion this year and could well advance to the $3 billion to $5 billion class in the next five years. Milton Stone, EDP specialist for Arthur D. Little Inc., management consultants, believes the potential for the total information handling field (EDP is a big part) could fall anywhere between $5 billion and $9 billion by 1970.

• **Matter of Semantics**—Why the big difference? The industry, which is barely a decade old, hasn't come up with a precise definition of EDP. The broadest encompasses all electronic information handling equipment and a wide range of both electronic and electromechanical peripheral equipment used in data processing, industrial control, scientific research, and military applications. But the purists limit EDP to the central computer and its immediate peripheral equipment, such as standard input and output devices.

Regardless of how you define it, the potential for both producers of EDP equipment and their suppliers is enormous. Listen to L. R. Sheeley, manager of sales for GE's Computer Dept.: "We fully expect that within the next decade, 80 per cent of computers sold will be used in applications untried today. And we believe that electronic handling of information—with computers as the nerve center—will have the greatest growth of our economy during the 1960s."

• **Potential to Sales** — But turning potential into sales will require continued research, especially in the peripheral equipment. Most producers agree that today speed is a secondary consideration (although they will continue research in that direction). But with operations being measured in some cases in nanoseconds (new jargon for billionths) instead of millionths of a second, the speed of the computers is outdistancing the ability of the peripheral equipment to get information in and out of the machine, declares Honeywell's Mr. Finke.

"The greatest single problem is probably the development of improved, higher speed input equipment," he says. "The need in the application and programing area is to find ways of making the most efficient use of the modern computers and the means of programing them economically and rapidly," he adds.

• **Universal Language**—One step in this direction is the development of a common business oriented language (COBOL). Early this month, Radio Corp. of America and Remington Rand Div. of Sperry Rand Corp. demonstrated the interchangeability of plain English programing between Univac II and RCA 501 systems before the Executive Committee of the Conference on Data Systems Languages (CODASYL). Remington Rand officials say that use of COBOL reduces greatly the time required for programing, debugging, revising and updating programs, and training programers.

Sales Top $1 Billion Mark

CODASYL says there are 11 other manufacturers who are developing COBOL compilers for 26 makes and models of data processors.

• **Training Needed**—Another major roadblock to the realization of sales potentials is the lack of trained personnel. "We have the machines and technical knowhow to solve many of industry's problems, but neither business nor the colleges are doing an adequate job of training EDP personnel," laments one producer. He suggests that colleges offer courses in data processing just as they do in marketing and other business practices.

• **Competition Stiffens**—Serious as they are, those and other problems have not dampened the research and development efforts of the industry. Since early fall, announcements of new systems and supporting equipment have been coming fast and furious. Last week, 65 firms displayed the latest in systems, components, and related equipment at the 10th Eastern Joint Computer Conference. Nearly every week, there is an announcement or rumor of a new entrant into the EDP field.

One official likened the present competitive condition of the EDP industry to that of the auto industry in the twenties and thirties, when many things were tried but few survived. Mr. Stone, of Arthur D. Little, told a recent meeting of the Cleveland Society of Security Analysts that there are five criterions for a successful company in this industry.

1. It must have intent—the willingness and ability to invest heavily.
2. It must have superior production facilities.
3. It must have a superior product service package.
4. It must have a broad and integrated product line.
5. It must have a continuing development program.

Applying those benchmarks to the industry, Mr. Stone said that by 1970, the Big Five in the general purpose field would be: International Business Machines Corp., GE, RCA, Remington Rand, and Minneapolis-Honeywell. However, he added, there is still plenty of room for other companies competing in the area of smaller, more specialized equipment.

• **Suppliers' Opportunities** — For suppliers of the EDP industry, opportunities are legion. Basically, the industry assembles its machines and systems from components made in other divisions of parent companies or by independent suppliers. Because much of the business is via rentals, manufacturers tend to tie up capital in the systems themselves and not in production facilities for parts. IBM officials feel the trend is more to buy parts than to make them. Most others agree, at least for the immediate future. However, when and if the time comes when outright sales predominate over rentals, they feel the trend will reverse and equipment makers will integrate vertically.

Right now, IBM says the greatest opportunity for suppliers is in semiconductors—diodes, transistors, solid circuits.

GE officials foresee a rising need for such electromechanical equipment as card readers, punches, document handlers, and print readers.

Mr. Finke points out that there is a growing market for such unsophisticated products as wire, power supply equipment, and various types of production equipment.

How EDP Will Grow in the '60s

(Value of equipment shipped; escalated dollars and cost reduction considered)

	1959	1960	1965	1969
	(IN MILLIONS)			
Hardware*	$1,013	$1,070	$1,901	$3,036
Software**	491	591	873	1,240
Totals	$1,504	$1,661	$2,774	$4,276

*Business, scientific, industrial, and special military computer systems shipped to all domestic customers.
**Product service, spare parts, programing, applications required by computers installed in the field and computer service bureau activities.
Source: Estimated by General Electric Co.

Why Tool Builders Fight Walsh-Healey Act

- **Wages in a substantial number of plants will be below the minimum set by the government.**
- **Business is down and wage averages are already above normal. Reason: Higher paid workers (most seniority) are kept on, while low seniority workers are laid off.**
- **Machine tools are vital to national security; the industry shouldn't be weakened.**
- **Tool builders question the definition of their industry as set by the Labor Department.**

SOMETIME in 1961, probably in the third quarter, the federal government will order machine tool builders to pay a certain minimum wage if they wish to bid on government contracts. In effect, a minimum wage has been set for the industry, argue some. "Nonsense," say others. "It simply protects the high wage plant from being underbid on government work by a low wage plant."

The secretary of labor makes the determination after having learned the facts from a Bureau of Labor Statistics survey. Under the Walsh-Healey Public Contracts Act of 1936, the secretary is allowed great latitude of action.

Why pick the machine tool industry?

Recent determinations have involved four segments of the electronics industry, metal fabricators, and the manifold business forms industry. The availability of data on the industry could have something to do with it: Machine tool people have been concerned about a recent AFL-CIO study of their industry's labor force. At any rate, anyone has the right to request the secretary to look into an industry. Then a process of 12 to 18 months' work begins, including the usual hearings, panel meetings, private discussions with high government officials, and the questionnaire to industry. It all ends with the secretary "finding that a minimum wage rate of so much per hour prevails in the widgit industry." And that's it: If you want government work, you pay that minimum.

● **INDUSTRY'S VIEWPOINT**—"I know of no industry which has not been adversely affected by a minimum wage determination," says the counsel for one group.

The Walsh-Healey Act "sometimes hurts the very people it was designed to help," argues the U. S. Chamber of Commerce. One metal fabricator in Georgia closed his plant rather than raise his minimum from $1.10 an hour to $1.43 an hour, says the chamber.

A spokesman for the machine tool builders says the Fair Labor Standards Act of 1937, which set a national minimum wage, has made the Walsh-Healey Act unnecessary.

The Office of Civil & Defense Mobilization is sponsoring studies of the machine tool industry to determine how such a national security industry can be helped by the government. Yet, in the arguments before the Labor Department hearing examiner, the fact that the industry is operating at depressed levels will have little or no bearing on the minimum wage determination.

● **GOVERNMENT'S VIEWPOINT**—The government's labor economists agree that the effect of a determination on an industry is "minimal." One admits no studies have ever been made to prove the point, but the argument goes like this: A determination is made 18 months or so after the payroll period studied to learn the prevailing minimum. So, times being what they are, chances are that wages have gone up enough to make the minimum wage determination out of date as soon as it is published.

Considering the basic intent of the act, one government labor expert notes the unfairness of one region of the country being able to underbid other regions for government work just because its labor costs are lower.

● **CHANGES MAY COME**—Rep. Edgar W. Hiestand (R., Calif.) is one congressman actively trying to modify the Walsh-Healey Act. He wants to exempt from the act's coverage all industries already covered by the Fair Labor Standards Act. His point seems reasonable, especially if the new Congress raises the minimum wage to $1.25 an hour as expected.

Other needed changes, listed by industry sources: 1. The hearing examiner should place more emphasis upon the sharp distinctions in some industries between regional wage patterns. 2. The secretary of labor should be able to delay a minimum wage determination if the industry in question is depressed or of special significance to national security. 3. The minimum should not be set at the industry's median level, as it so often is, because too high a proportion of the industry automatically falls below the minimum.

The matter of defining the industry in question also needs more understanding, say industry sources. In the machine tool industry case, all builders whose tool sales were less than 50 per cent of their total sales have been eliminated from the BLS survey.

Improved Copper Coating for Wire Increases Coating Adherence, Color Uniformity

AMCHEM CUPRODINE* NO. 5 IS A LOW COST, NON-ELECTROLYTIC COATING FOR LUBRICATING CARBON AND STAINLESS STEEL WIRE, TIRE BEAD WIRE, COLOR CODING AND DECORATING PARTS

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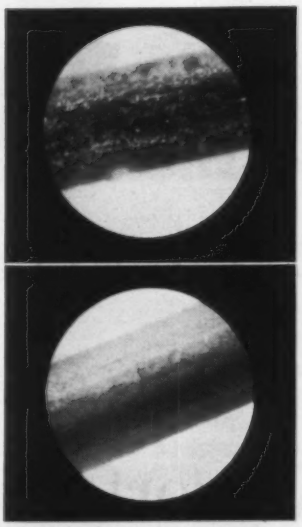
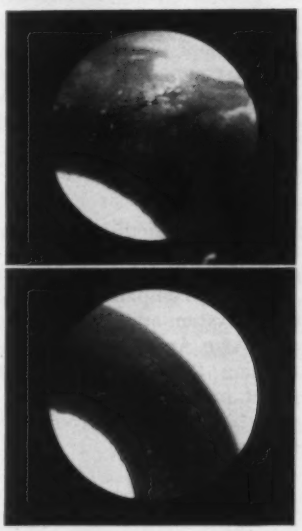


At top, photomicrograph (50x mag.) of copper sulfated wire after removal of the coating in ammonium persulfate solution. Note heavy corrosive attack and pitting on copper sulfate-treated wire. At bottom, Cuprodine-treated wire subjected to same test.



At top, photomicrograph (50x mag.) shows copper sulfated wire after simple manual bend test. At bottom, photomicrograph shows bend tested Cuprodine-treated wire exhibiting only a slight attack to coating while copper sulfate-treated wire shows heavy flaking of coating.

AMCHEM **CUPRODINE**

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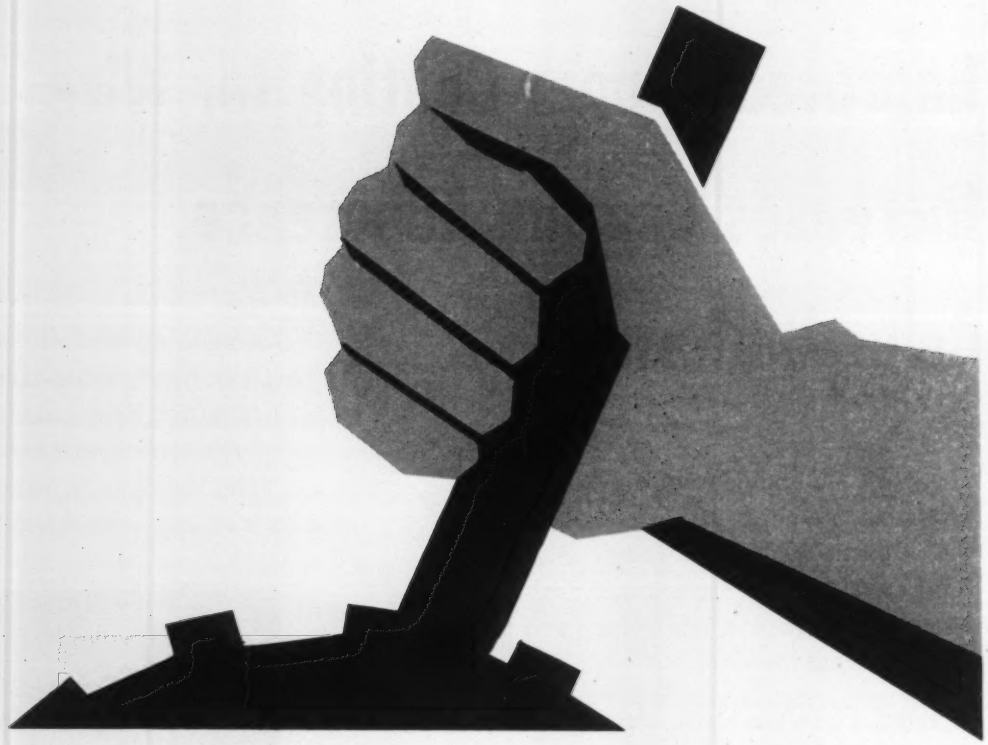
*Amchem's registered trademark for its copper coating chemical.



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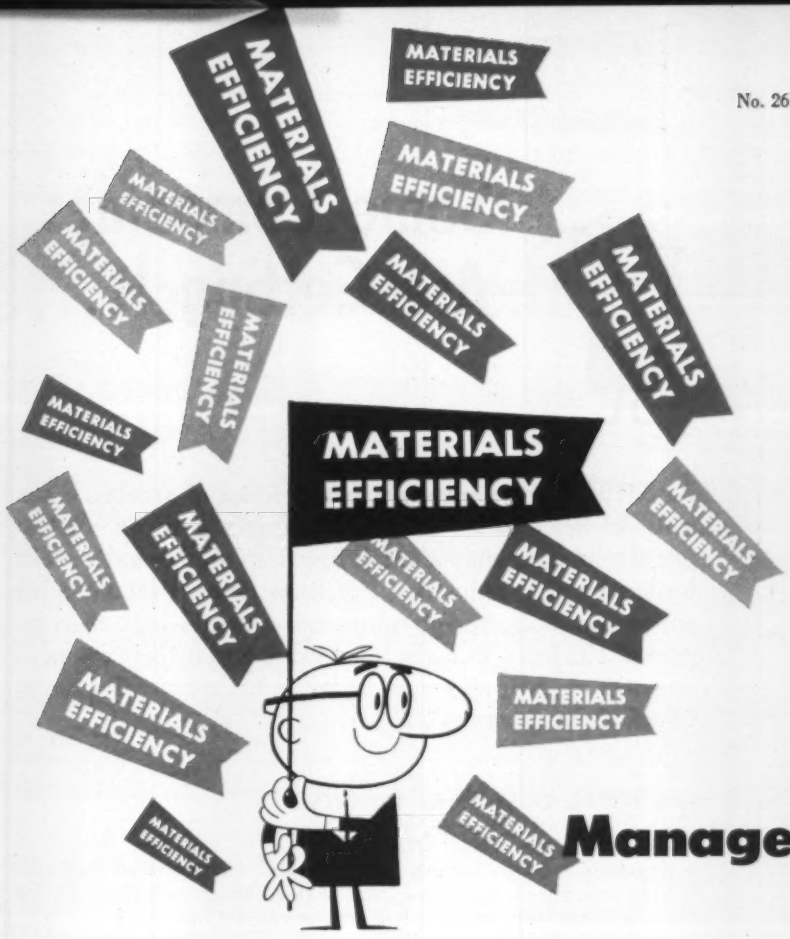

Management Gets It

CONSUMER PRICES have jumped 18 per cent since 1950. Wages in the durable goods industry have climbed 40 per cent. The increase in imports and decrease in exports in steel from 1957 to 1959 amount to a loss of 7 million tons in finished products.

Only greater efficiency can meet the triple threat of inflation, spiraling wages, and adverse trade trends. Materials open up many avenues to efficiency because:

1. On the average, they account for more than half your costs. (Most materials men define them as anything you buy or make, including components, to go into finished products.)

2. Great technological changes are occurring, giving wide scope for changes in design, improved reliability, substitution, and many other techniques for cutting costs.

In steel, for example, "the future of the industry is tied to new ideas and developments," says R. L. Gray, chairman of Armco Steel Corp. Armco's president, Logan T. Johnston, predicts makers "will introduce at least twice as many new products in the next ten years as they did in any other decade."

How can the potential be achieved in materials efficiency? Three related approaches are needed, the experts say: 1. Better organization of the materials function. 2. Higher buying standards. 3. More skillful purchasing.

Better Organization

Many executives believe materials management is the answer to better organization of the materials function. It's the most controversial concept to hit purchasing since value analysis.

Andrew M. Kennedy Jr., vice president for purchasing and traffic at Westinghouse Electric Corp. and chairman of a National Association of Purchasing Agents committee investigating the matter, defines it:

"Materials management represents one complete, undivided responsibility for providing the materials a company needs . . . in the right quantity and quality . . . at the minimum cost—which cost should include transportation, inspection, storage, and delivery to point of use."

The last clause, "which cost should include transportation, inspection, storage, and delivery to point of use," makes materials management distinct from straight procurement. Some definitions go even farther. They extend to the control of materials into, through, and out of the plant.

Although the concept can be successful under almost any conditions, it works best in the smaller and medium companies where executives have to wear several hats. Many small firms probably have been practicing materials management from necessity, although not calling it that.

In larger firms, it works best with high volume, repetitive products.

Materials management requires a

man of parts to make it work. The bigger the company, the more difficult it is to co-ordinate the whole materials function through one man. Often, the job may be broken down and parceled among several executives. But the co-ordination can be achieved by committee.

Teamwork is essential in materials management. Lack of it usually comes if: Co-ordination is poor at the top; communications are inadequate; and key personnel don't see the whole picture.

The commandments of teamwork:

1. All players must be paid adequately.
2. Each man must be convinced that he can upgrade himself.
3. Each player must understand and accept each new procedure before it's adopted.
4. The team needs good two-way communications.
5. Each player must know the relationship of his job to that of others.
6. If the man is involved in a new play, he should be brought in at the start.
7. The coach must know the capabilities of all players.
8. Each player needs credit for his contribution.

Higher Buying Standards

The right organization of the materials function is a giant stop toward creating higher buying standards.

Purchasing has come a long way in a short time. The procurement problems of World War II gave the PA new stature in the business community. Despite incidents like the Chrysler case and continuing petty breaches of business morals, the buyer has upgraded himself until he is now on the verge of professionalism, or in some cases, has reached that status.

From talks with authorities, STEEL has arrived at this ideal definition of a purchasing professional: He is a creative, intelligent, honest, loyal man who accepts and practices the policies and objectives of his company. He has a thirst for knowledge—and puts his experience to work for the company. He recognizes the problems of other departments and constantly seeks to assist them. He thoroughly understands the manufacturing operations and engineering practices of his company.

MATERIALS EFFICIENCY

Some Companies Are Getting It.....

As STEEL has emphasized in this series of articles, materials efficiency spells success. The firms that do an efficient job of managing the materials functions are generally profit leaders in their industries. But firms doing a laudable job are too few. Still, enough companies are achieving a high degree of efficiency to make it imperative that their competitors step up their efforts, or be left in the competitive lurch. Check these examples . . .

IT'S TOTAL COST THAT COUNTS

Thompson Ramo Wooldridge Inc., Cleveland, had been machining a ring from a rough forging. Changing to a semiprocessed ring (the forging was rolled, contoured, and sloped) meant a higher cost for the purchased unit, but end cost was trimmed 43 per cent.

KEEP YOUR EYE ON NEW MATERIALS

Using a half ton of titanium in the airframe of the Douglas DC-8 Jetliner permits the hauling of five extra passengers and their luggage per flight. The higher initial cost will pay dividends.

STANDARDIZE FOR EFFICIENCY

Norton Co., Worcester, Mass., saved $3700 in one year by standardizing on ball bearings . . . Rockwell Mfg. Co.'s power tool divisions whittled a list of 123 different types of nuts down to 54 and changed half of those specifications. Savings: $5000 annually.

RELIABILITY IS IMPERATIVE

At Minneapolis-Honeywell's Aeronautical Div., Minneapolis, "personalized quality control"—a program that brings the production worker into the reliability act—cut rejects by 60 per cent and boosted output 10 per cent in one year.

ALWAYS QUESTION BEFORE ACCEPTING

L. A. Dahlheimer, director of purchases for Emerson Electric Mfg. Co., St. Louis, never automatically accepts an engineer's specifications. Result: In buying steel for a motor part, he replaced the type specified with one that performed equally well but cost $9 per ton less. Then he immediately began investigating other possibilities and came up with one that would save another $13 a ton.

.....How About You?

In the last six months, how many times have you switched from one material to another? _____

How many of your products have you redesigned in the last year? _____

Have you investigated the feasibility of adopting the materials management concept in your company? _____

Have you considered using a computer in inventory control, production scheduling, design, order processing, or other areas? _____

Have you tried to combine orders to build savings? _____

Do you have an active standardization program? If so, are you saving $6 for every $1 invested (the national average)? _____

Have you examined all your packaging for cost cutting possibilities? _____

Do you ask all salesmen you see about any items their companies might be developing that you could use? _____

Have you an organized approach to discovering and investigating new materials? _____

Do you have an organized reliability program? Does it involve all departments, including the production worker? Does it start in design? _____

Do you have a formal vender rating system? _____

Do you have an active and continuing approach to: 1. Reduce the percentage of scrap generated? 2. Convert scrap for productive use? 3. Upgrade scrap for more profitable resale? 4. Improve handling of scrap? _____

Are your purchasing men striving for professionalism with deeds—or just with words? _____

Do you solicit suppliers' help in cutting costs and hiking quality? _____

Is your materials function co-ordinated from the top—to get the most teamwork? _____

Is communication adequate among members of the materials team? _____

Do you negotiate these items: Price? Delivery? Engineering service? Quality control? Design responsibilities? Warranties? Percentage of price reduction that can be expected on repeat orders? Inspection? _____

He is receptive to competent counsel—internal and external. He buys without prejudice, denounces all forms of commercial bribery. He is skilled in human relations techniques. And he is constantly aware that he represents his company—that the image he creates in the eye of a potential supplier is the image the supplier will hold of his company.

Top management must set the proper moral tone if it expects its purchasing people to observe the principles of good conduct. David S. Gibson, vice president, Worthington Corp., Harrison, N. J., says management can insure higher ethics by: 1. Recognizing purchasing as part of the management team on par with marketing, engineering, and manufacturing. 2. Being more selective in taking people into purchasing. 3. Establishing an educational program that offers at least a partial tuition refund. 4. Supporting and participating in purchasing education work in schools and associations.

More Skillful Purchasing

Professional status also comes when the purchaser is more skilled at his job. Like any pro, the buyer can still learn in many areas, but the experts advise:

1. Make materials work harder.
2. Look at what new materials can do.
3. Pick the right materials.
4. Standardize.
5. Get higher reliability.
6. Slash scrap costs.
7. Use suppliers' brainpower.
8. Get more for less.

• **Make Materials Work Harder**—Sometimes, the new materials provide an answer, but designers and producers advocate a more basic approach: Keep up to date on the changing capabilities and combinations of the standard metals and nonmetallics. They open a major route to creative buying.

Are you buying more quality than you really need in your material? Thompson Ramo Wooldridge Inc. switched from alloy to carbon steel for a bolt and saved 5 cents per unit.

Can design changes help you? Aluminum Co. of America shifted its design from a hand forging to a

precision forging to cut machining losses from 1170 to 60 lb.

• **Look at New Materials**—They may be the wonder drugs your company needs, yet they are likely to be expensive. You don't use them for every headache; they can cure special ills. Examples:

Special problems—General Electric Co. uses M-50 tool steel to make bearings last five times longer in the J79 engine.

Unusual properties—Kelsh Instrument Co., Baltimore, needed great rigidity and low weight for mapping instruments. The answer was a new, high strength, aluminum alloy.

Miniaturization—GE uses ceramic-metal discs to make micromodular electronic circuits. A stack of the discs the size of a cigaret will do the work of 44 electronic components.

Weight reduction—Use of a half ton of titanium in the airframe of the Douglas DC-8 Jetliner increases passenger capacity by five.

• **Pick the Right Materials**—Consider function first and the material second. The functional approach, applied to service conditions, led to the development of differential coatings on tin plate. The outside of a can, in normal service, may not need as heavy a coating as the inside.

You still haven't finished after you've chosen a material for a job. John Repp, head of value analysis for Emerson Electric Co., feels that a product made the same way for two years is usually ripe for improvement.

Today's metalworking managers are trying to pick the right material in the design stage where it's cheapest. They're getting information on new materials from customers, consultants, computers, committees. They're asking employees and venders for suggestions.

• **Standardize**—Picking the right material also involves standardization. Standards insure that a fitting fits the pipe, that a lamp screws into a socket, and that the bolt matches the nut. The U. S. economy could save at least $4 billion a year through standardization, believes American Standards Association. Savings range up to $50 per $1 spent on standards work. On the average, $6 is saved for every $1 invested in standards activities.

Your losses may be substantial, although partly hidden, if you don't purchase standard parts wherever possible. Too many companies let the draftsman make a decision for a special that will triple their fastener costs. Redesign can bring standardization benefits, too.

• **Get Higher Reliability**—Picking the right material includes choosing it for reliability. Reliability is not a new concept, but the need for it has never been greater.

To put an Atlas missile on target 9 times out of 10, each of the missile's 300,000 components must have a reliability of 99.99996 per cent. That points up the fantastic demands being placed on metalworking by the Space Age—and not just on the missilemaker. All customers want products that will perform better longer. And they want that quality at no—or little—extra cost. Result: Emphasis on reliability promises to become one of this decade's most significant trends.

It's tough to get. The key is people who must design for it, test for it, produce for it, and buy for it.

• **Slash Scrap Costs**—Higher reliability is a principal way to cut the percentage of scrap generated. Three other routes:

1. Convert as much of the remaining scrap as possible to raw material for other uses.
2. Upgrade the quality of the scrap that can't be converted to get the highest possible price for it.
3. Improve in-plant handling.

• **Use Suppliers' Brainpower** — To make materials work harder, pick the right ones for higher reliability, and lower scrappage, you, the purchasing agent, need help. On the average, only three people report directly to you. Your reach is extended via the supplier when you:

1. Appraise his performance systematically.
2. Ask for help.
3. Know suppliers better.
4. Co-operate more with them.
5. Change sources if all else fails.

• **Get More for Less**—You do that by negotiation. "It's the most advanced form of purchasing skill," says Wilbur Pierce of Detroit Edison Co.

He lists 11 times when it pays to negotiate:

1. When there is only one satisfactory source for the item.
2. When you don't know how an item can be made.
3. When you want to develop a product never available before.
4. When you are doing follow-up procurement.
5. When the supplier was preselected for you.
6. When you plan to buy from a firm that was not the lowest in competitive bidding.
7. When you want a special procedure followed (additional inspection, for example).
8. When the market price is common knowledge.
9. When design changes are anticipated.
10. When engineering or tooling costs are high.
11. When extraordinary risk is involved (high dollar volume, long leadtime).

The purpose of negotiating is to arrive at a mutually satisfactory agreement. Be sure the deal you make is good for you, the vender, your industry and his, and the economy.

'61 Management Series

Starts Jan. 16

STEEL's award winning Program for Management will appear every other week throughout next year. This article is the last of the '60 Management series. For a free copy of any or all in the program, write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. By using material like this on the job, you may win $1000. For details, see Pages 5 and 6.

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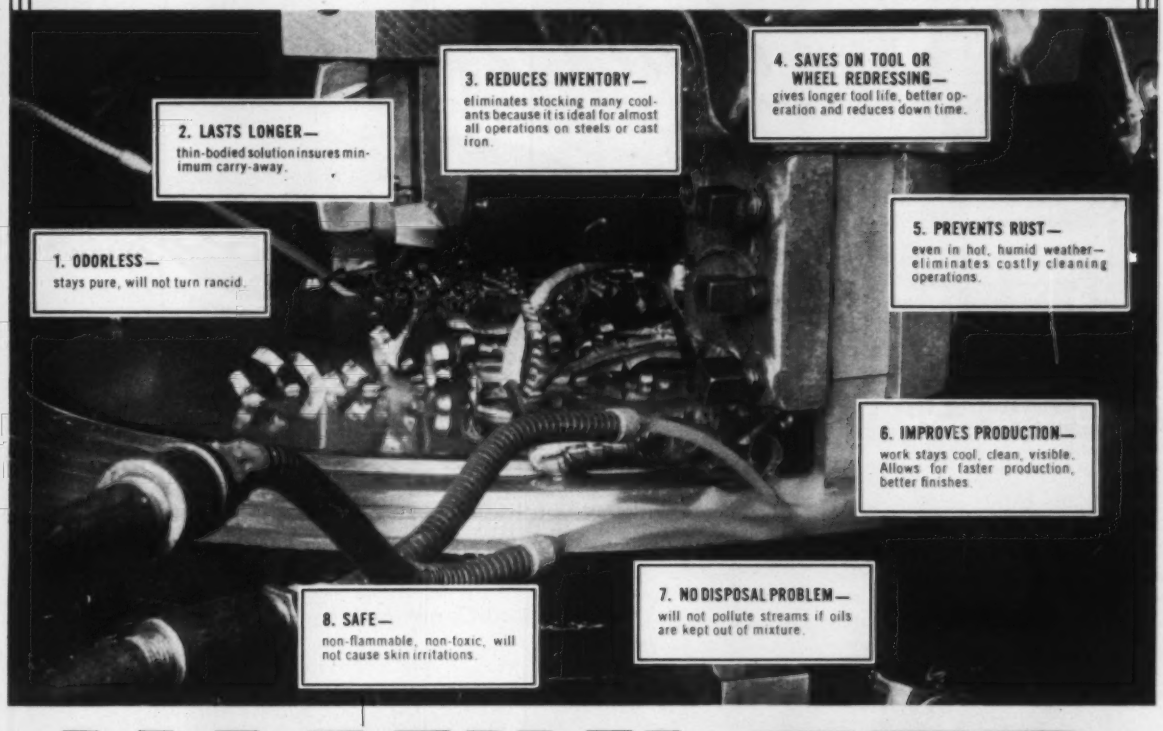
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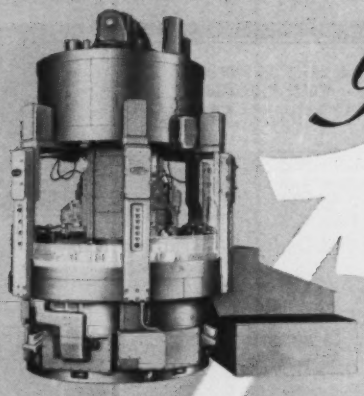

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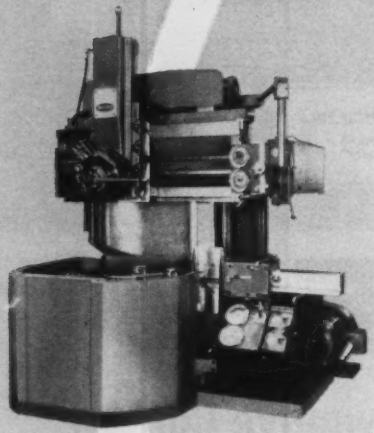

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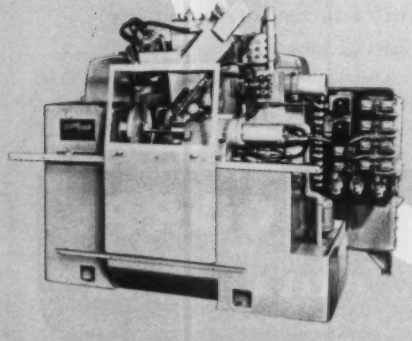

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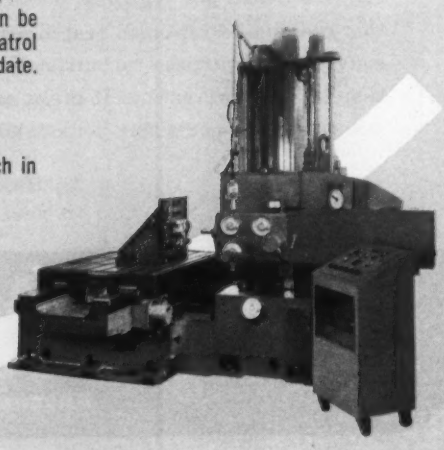

S-P Sales Drop Pinches Profits

	1960*	1959	1958
		(In thousands)	
Car Output	108	153.8	56.8
Car Sales	105	136.7	52.4
Truck Output	12	10.7	10.5
Employment	9.2	10.7	6.1
Net Income (Millions)	$1.0	$28.5	−$13.4

*Anticipated.

Studebaker Delays Small Car Plans

DESPITE THE RUMORS, Lark will not be dropped in 1962, but Studebaker-Packard Corp. has indefinitely delayed plans to market a 101 in. wheel base car that had been scheduled to appear next fall. S-P will restyle the Lark and Lark Cruiser.

If it can cut vehicle weight, it may attempt to add the small car's four cylinder engine to its powerplant lineup, but that is most doubtful.

Company sources report that low profits for 1960, plus the risk of entering a questionable area of the market are the reasons behind postponement of the small car. The $26 million Studebaker reportedly would have to spend to bring the vehicle to market is equal to a quarter of the company's current net worth.

Right now, the South Bend, Ind., automaker is more concerned about squeezing out a profit in 1960. It then can utilize some of its $15 million tax credits which expire this year ($85 million remain). At the end of nine months, net income was $104,780. Although its five nonautomotive subsidiaries and Mercedes-Benz Sales Inc. are expected to net some $5 million, second half losses in the automotive division will wipe out that profit and may push the company into the red. Lark sales will wind up 23 per cent below last year's. Market penetration is less than 2 per cent. The company has 2300 dealers instead of the 2530 it claimed in 1959.

Higher operating costs are one reason for the profit pinch, but car production in the last two quarters indicates the company may be below its standard volume level. That lends credence to earlier reports that Studebaker's breakeven point still is around 112,000 units.

• **Black to Bright** — On the encouraging side, Lark fleet deliveries have risen from 8 to 10 per cent of unit car sales. Exports are 57 per cent higher than last year's. Mercedes-Benz Sales Inc. will sell its full quota of 12,000 Mercedes cars. Factory truck sales are holding close to production. This year's registrations should reach 6000 units—up from 5906 in '59 and 4102 in '58. Production will be down this month and next while the company makes model changes, including a wider box on its pickup trucks. There also are hints that S-P will enter the diesel truck field through its cross licensing agreement with Daimler-Benz A.G., Germany. It may also import a three wheeled, gasoline powered delivery truck.

Studebaker reports it is carrying an average steel inventory of 40 to 45 days based on present production rates. If these schedules continue, the company can be expected to buy more than 140,000 tons of metalworking products for its 1961 car output.

Aluminum Engine Programs Lose Some Momentum

Considerable discussion has arisen around Detroit concerning the status of forthcoming aluminum engines: Production and design problems are causing automakers to hold up most of such programs (STEEL, Nov. 21, p. 71). However, there is no doubt that more aluminum engines will appear within the next five years. Here is the lastest progress report on various programs, gathered from various industry sources: (*Please turn page*)

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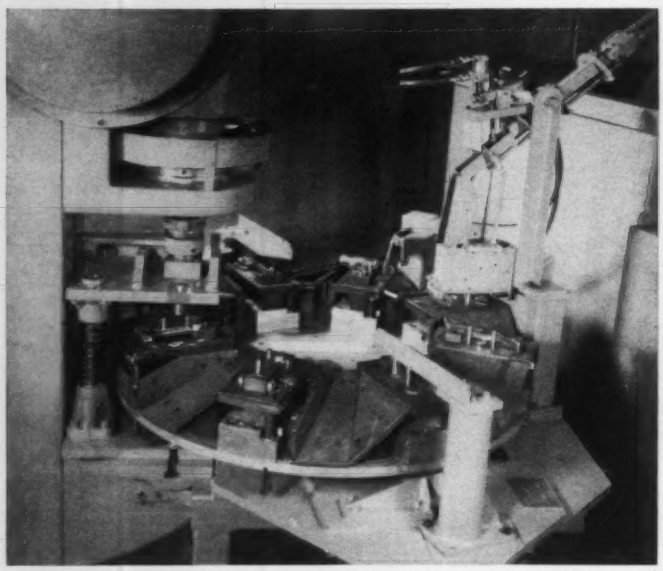


Connecting Rods Straightened Automatically

STRAIGHTENING engine connecting rods traditionally is done in hand operated presses, but General Manufacturing & Engineering Co., Detroit, has designed and built a machine that will automatically straighten 1200 rods an hour.

The machine is being installed at Atlas Drop Forge Co., Lansing, Mich., to process parts for a series of Ford engines. Only one man is needed to service the machine. Harvey La Douceur Jr., General's vice president and manager, says the design can be adapted to handle other parts, such as transmission tuning forks, flat cams, and similar configurations.

Rod forgings are dumped into a 30 cu ft hopper attached to the machine. The hopper holds 1500 to 1800 forgings. A chain driven conveyor elevates the rods to a vibrating orienter which positions them on a track so the parts can slide into a loading magazine above an eight station, rotary index table. Limit switches control the number of rods being fed into the magazine.

Each rod is stripped from the magazine automatically and positioned in one of the straightening fixtures on the table. After indexing, a mechanical profile checker inspects the unit to see that it's correctly located. Incorrectly positioned parts automatically are ejected at the next station and returned to the hopper.

The next two stations are under a 30 ton mechanical press which is air operated with conventional line pressure. The first operation presets the rods. A second blow straightens them to plus or minus 0.015 in. Completed parts pass through an idler station, then to an ejector where they are transferred by a conveyor for further finishing operations.

Chevrolet will continue to produce the air cooled, aluminum Corvair engine, but its upcoming four and six cylinder powerplants will be gray iron. Corvette may introduce a larger aluminum V-8 by 1963.

Buick-Oldsmobile-Pontiac compacts will continue with the present 215 cu in. aluminum V-8 (optional for Pontiac), but Oldsmobile has put off indefinitely plans for a larger V-8 made from aluminum. The Buick program has been shoved back at least to 1963. Pontiac is sand casting a six cylinder from aluminum as a design excercise but it won't be out next year (probably never).

American Motors Corp. will continue with its diecast aluminum six in 1962, but does not expect to introduce any other lightweight powerplants for several years. It is studying both four and eight cylinder jobs.

Chrysler will continue diecasting its aluminum six in limited volume. It may not be able to produce the 15,000 units it had scheduled for 1961 and probably won't boost its output in 1962.

Ford has an aluminum V-8 project, but there are no signs that the company wants to produce it for '62 or '63. It's more interested in a newly designed, gray iron V-8, which is supposed to show better than a 20 per cent weight reduction over the present 292 cu in. engine. It appears to be ready for 1962 models.

Summary—Four of the programs appear to be virtually scrapped. Another four have been delayed. The four engines that are in production will be continued, but at this time it looks like no more aluminum powerplants will be introduced for 1962 cars.

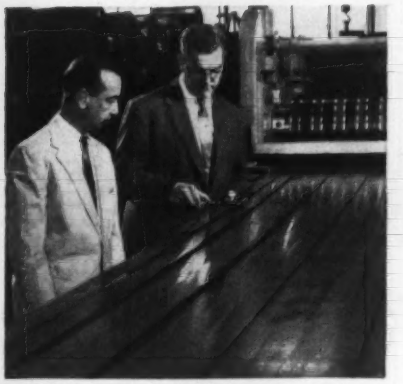
U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
June	613,147	557,995
July	434,377	555,410
August	305,527	239,152
September	407,685	258,151
October	617,816	507,527
November	597,132	254,527
11 Mo. Totals	6,172,115	5,098,779
December		494,931
Total		5,593,707

Week Ended	1960	1959
Nov. 12	138,682	64,233
Nov. 19	149,753	68,476
Nov. 26	111,091	46,740
Dec. 3	135,348	55,337
Dec. 10	136,021†	86,566
Dec. 17	135,000*	152,449

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.



At left, Leslie Edgcomb, Jr., director of purchases for Edgcomb Steel, looks on as Joseph Drexler, vice president and general manager, checks the width of a slit strand.

Edgcomb Steel expands product range and speeds delivery with Wean slitting line

Edgcomb Steel Company, like so many other metal service centers, has noted a continuing trend toward the purchase of metals in coil form by its customers. The increasing demand for aluminum, stainless steel and carbon steel in this form is due to the lower costs realized by metal users through coil processing. Edgcomb has equipped three of its four plants with slitting lines to satisfy this requirement.

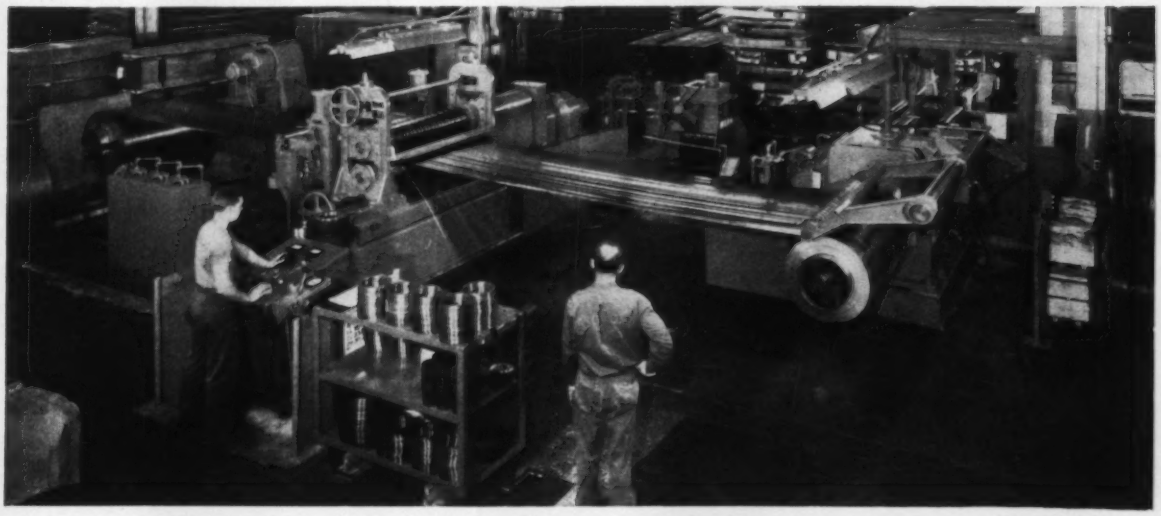
The firm's York plant was set up in 1954 around the Wean slitting line illustrated. Coils, stocked in standard widths up to 48″ and gauges ranging up to .125″, can be slit and side-trimmed quickly and economically to fill customer's orders for narrower widths. Two sets of knives, one for aluminum and one for steel, equip the line to process both metals at speeds up to 800 fpm.

Wean is a leader in the design and construction of coil processing equipment. Whether your operation involves slitting, shearing or stamping metal from coils, Wean can supply the equipment to do the job quickly, accurately and economically. A comprehensive discussion of these operations is contained in a brochure entitled, "Coil Processing." We will be glad to send you a copy if you will send us your request on business letterhead.

WEAN EQUIPMENT CORPORATION
22800 Lakeland Boulevard
CLEVELAND 17, OHIO

WEAN

Wean slitting line at Edgcomb Steel's York plant makes 22 cuts in mild steel on this run for a customer who will form tubing from the slit coils.



Need a tube with walls 3 feet thick?

You probably won't find one. But if that's the kind of strength you need, we can make an austenitic steel tube for you with walls approximately an inch thick that will have the strength of a low-alloy tube with walls 3 feet thick.

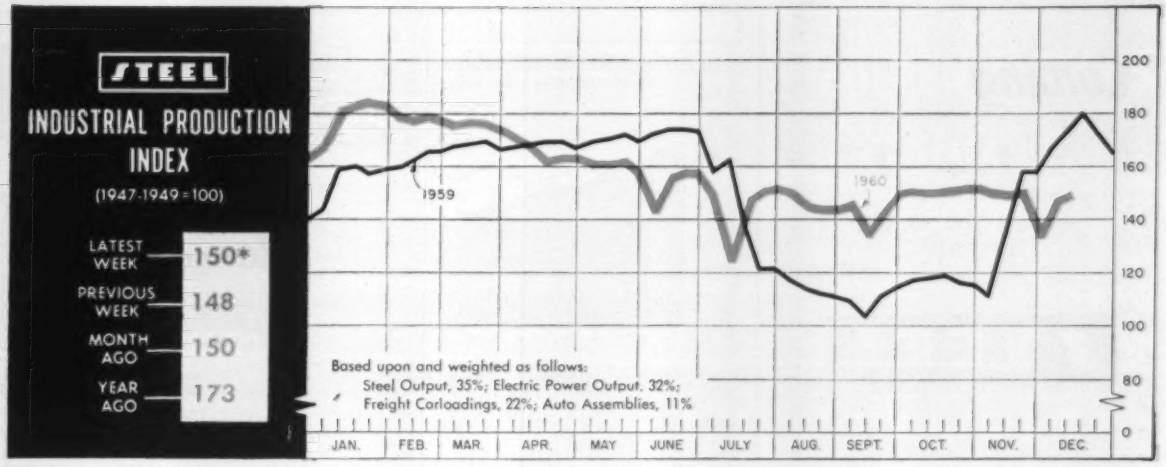
That's the kind of tubing we specialize in. We've been solving tough industry problems with Timken® seamless steel tubing for over forty years—in steam generators, oil field equipment, chemical equipment—wherever unusual combinations of heat-, pressure-, or corrosion-resistance are required.

You can get Timken heavy wall seamless steel tubing up to 11" O.D. and 3¼" wall. It's available in all the popular low and intermediate alloy steels and austenitic grades—304, 316, 321, 347 and other special analyses.

If you have a difficult tubing problem of any kind, Timken Company metallurgists are eager to work with you and help solve it. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

TIMKEN®
***Fine Alloy* STEEL**

TIMKEN ALLOY STEEL AND SEAMLESS STEEL TUBING ARE AVAILABLE FROM STEEL SERVICE CENTERS IN 44 CITIES IN THE UNITED STATES



*Week ended Dec. 10.

Downtrend Unaltered in 4th Quarter

BUSINESS CONDITIONS have changed but little in the fourth quarter. That's shown by the most recent tabulation of the 34 statistical indicators which STEEL presents periodically on the following two pages.

The direction is still down, but at no greater pace than at the beginning of the quarter.

• **Summary**—Data for the indicators cover October, for the most part. Twenty were below the level of the prior month, exactly the same total as two months ago. Twelve showed an improvement compared with 14 in the earlier tabulation. The rest were practically even with their positions in early October.

When considered on the basis of long term trends, the score of the two periods again shows that the downtrend has been continuous and even. Two months ago, 21 were declining, the same as in December. Seven are climbing now compared with eight at the start of the quarter, and six have been seesawing most of the way through the year compared with only four which were so considered two months ago.

• **Strike Distortion**—On the surface, comparisons with a year ago tend to substantiate the trends outlined above. Twenty-two indicators are below their corresponding 1959 levels compared with 24 in early October. Ten are up (same as earlier tabulation) and two even with year-ago levels. But seven of the plusses are apparently the result of the steel strike in the year-ago period. For instance, shipments of steel castings (see graph and table, Page 92) and gray iron castings probably would not be above the year-ago status if it hadn't been for the strike-depressed figures last year.

• **Heavy Industry Best** — With spending for plant and equipment still a fairly potent force in the economy (see STEEL, Dec. 12, pp. 45-46), it follows that those indus-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,387[1]	1,396	2,726
Electric Power Distributed (million kw-hr)	14,600[1]	14,368	14,167
Bituminous Coal Output (1000 tons)	7.315[1]	6,390	9,221
Crude Oil Production (daily avg—1000 bbl)	6,980[1]	6,984	7,123
Construction Volume (*ENR*—millions)	$446.1	$385.0	$388.4
Auto, Truck Output, U. S., Canada (*Ward's*)	167,360[1]	166,596	104,165
TRADE			
Freight Carloadings (1000 Cars)	515[1]	523	642
Intercity Truck Tonnage (changes from year ago)	−5.5%	−5.6%	+4.2%
Business Failures (Dun & Bradstreet)	290	276	261
Currency in Circulation (millions)[3]	$32,722	$32,638	$32,601
Dept. Store Sales (changes from year ago)[3]	−7%	−2%	+2%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$27,227	$22,732	$24,745
Federal Gross Debt (billions)	$290.4	$290.6	$292.4
Bond Volume, NYSE (millions)	$31.0	$30.9	$36.2
Stocks Sales, NYSE (thousands of shares)	18,315	16,809	17,001
Loans and Investments (billions)[4]	$107.3	$106.9	$104.3
U. S. Govt. Obligations Held (billions)[4]	$29.3	$29.0	$28.2
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	221.5	221.8	231.2
All Commodities[7]	119.5	119.6	119.0
Commodities Other than Farm & Foods[7]	127.9	127.8	128.5

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,849,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

Coming

Jan. 2

IN

STEEL

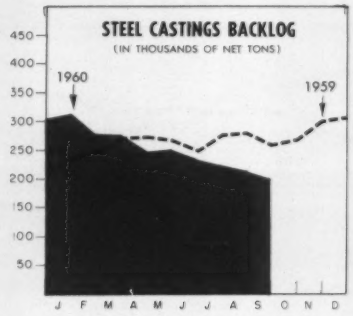
Revitalize your

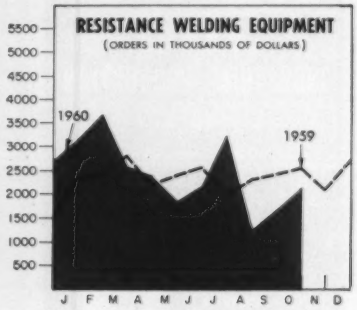
PEOPLE POWER

STEEL will devote a substantial part of its annual issue to an exhaustive study on how you can use human resources more effectively.

In the last decade employment costs have risen at an average rate of 6 per cent annually, compounded, while output has climbed only 4 per cent yearly, compounded. Efficiency is metalworking's greatest need. The industry will spend $58 billion next year on salaries, wages, and direct fringes. STEEL's first issue in 1961 will tell how to get more for that money.

THE BUSINESS TREND





	Shipments 1960	Shipments 1959	Unfilled Orders* 1960	Unfilled Orders* 1959
Jan.	122.6	105.4	314.2	232.6
Feb.	129.3	110.3	279.7	245.1
Mar.	143.7	131.3	278.0	270.7
Apr.	127.2	131.3	218.9	271.6
May	126.6	135.4	252.3	264.0
June	137.0	143.6	233.8	248.8
July	89.6	106.5	223.9	274.1
Aug.	101.7	98.0	213.6	279.3
Sept.	104.3	99.7	199.4	256.9
Oct.	....	105.6	....	268.9
Nov.	....	109.5	....	301.9
Dec.	....	133.3	....	306.3
Total	....	1,412.9		

*For sale. U. S. Bureau of the Census.

	Net Orders 1960	Net Orders 1959	Shipments 1960	Shipments 1959
Jan.	3,258	2,396	1,582	1,427
Feb.	3,732	2,457	2,563	1,889
Mar.	2,653	2,811	3,011	2,179
Apr.	2,446	2,258	2,943	2,193
May	1,871	2,407	2,310	2,019
June	2,205	2,597	3,267	2,702
July	3,244	1,980	2,221	2,269
Aug.	1,330	2,322	2,528	2,928
Sept.	1,689	2,435	2,559	2,113
Oct.	2,145	2,599	2,328	2,097
Nov.	....	2,131	....	1,597
Dec.	....	2,768	....	2,353
Totals	....	29,161	....	25,768

Resistance Welder Manufacturers' Assn.

Charts copyright, 1960, STEEL.

tries showing the best position now are in heavy goods. Construction awards show gains over both the short and long pull. Orders for railroad freight cars also are showing surprising strength, especially in view of the lack of vitality in the railroad industry in general. Orders for industrial furnaces are currently up, but the seesaw pattern for the year has resulted in less business than in 1959 as a whole. Demand for industrial supplies is slightly below the level of 1959. It has fluctuated just 5 per cent all year.

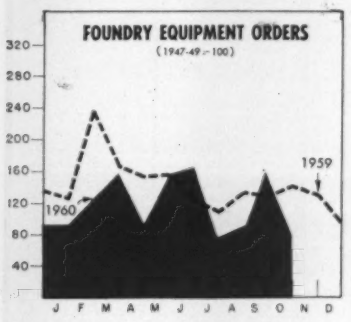
Machine tool orders as a whole have held up fairly well this year, thanks to foreign orders and demand for forming tools. Metal cutting tool orders have been disappointing. Orders for used machine tools have been erratic—causing optimism one month, dashing it the next. Latest report was fairly encouraging. Despite lower monthly levels during the last half of the year, cumulative orders for resistance welding equipment are virtually equal to the year-ago total (see graph and table, above).

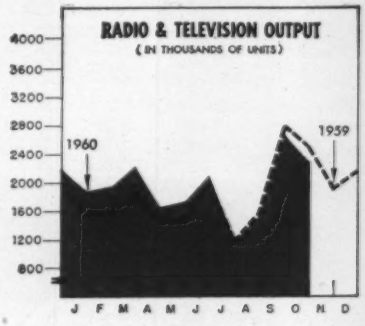
On the other hand, there are several capital goods makers, similar to foundry equipment producers (see graph and chart, Page 93), who have seen momentary spurts of activity, but who still find themselves considerably behind the 1959 pace.

Industrial Prices Down Steadily

The implication from the above study of random statistics is that the production section of the economy is still on the skids and probably will continue into 1961. Another of the ten so-called leading indicators—the price of industrial raw materials—tends to confirm this. The index, computed by the Bureau of Labor Statistics, has been in a general downtrend since February. That barometer has a fair record for calling the turns in the economy, but like most others, it has a blemish or two. Once again, it is wise to use those indicators as a group rather than individually in making your business plans.

With only one exception, a steady drop in industrial prices has portended a recession in the general economy. The exception: In March, 1951, prices began a steep descent which continued almost uninterrupted for three years. Instead of deteriorating, the Federal Reserve Board's industrial production index steadied in 1951, then took off upward. The reason: The Korean War, during which prices were held





	1960	1959	1958
Jan.	95.5	127.4	57.9
Feb.	128.6	237.1	57.6
Mar.	159.9	166.6	85.9
Apr.	97.9	154.2	88.7
May	159.0	157.0	136.1
June	164.8	125.1	87.7
July	80.0	110.7	77.9
Aug.	92.4	134.1	74.1
Sept.	158.1	131.3	64.5
Oct.	81.7	140.8	118.9
Nov.	....	131.2	83.3
Dec.	....	95.9	137.0
Avg	....	142.6	89.1

Foundry Equipment Mfrs. Assn.

	Radio		Television	
	1960	1959	1960	1959
Jan.	1,356	1,125	526	437
Feb.	1,442	1,125	503	460
Mar.	1,668	1,348	550	494
Apr.	1,230	1,040	423	389
May	1,277	1,040	442	432
June	1,551	1,430	519	571
July	890	829	269	350
Aug.	1,048	1,009	462	547
Sept.	1,945	1,981	679	806
Oct.	1,726	1,796	500	707
Nov.	....	1,316	...	561
Dec.	....	1,553	...	593
Totals	....	15,622	...	6,349

Electronic Industries Association.

in check while production zoomed.

On the up side also, prices tend to lead the trend. During the recessions of 1948-49 and 1953-54, industrial prices firmed and turned up nine months prior to a recovery in the FRB index. In 1958, industrial prices, like some of the other leading indicators, failed to forecast the sharp upturn in production but did change direction concurrent with the FRB index.

Chamber Questions Recession

The Chamber of Commerce of the U. S. declares that what the economy has gone through so far in 1960 is "hardly what we generally think of as recession." It points out that gross national product (GNP) this quarter will be about $10 billion (on an annual basis) above the corresponding figure a year ago in constant prices. And if 1961 as a whole turns out as most forecasters predict, it will be the third year of improvement in GNP and other major measures.

But the chamber recognizes cross-currents in the economy for 1961. Inventory adjustment, with a few exceptions (such as autos and appliances), is nearly in line, but it will take some time for the trend to reverse itself. Plant and equipment spending will be down about 5 to 8 per cent next year. And while auto sales should about match the 1960 total, production will be somewhat lower next year because of heavy inventories.

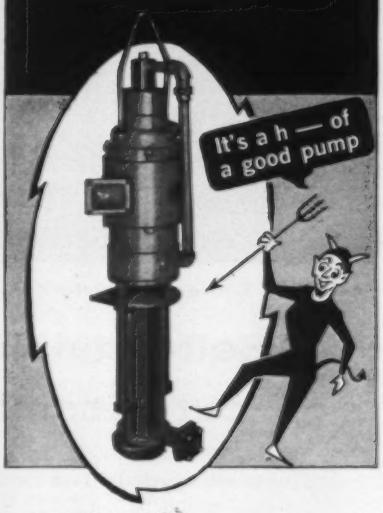
The big growth industry of 1961 —government—will offset much of that softness. The chamber sees a rise of $8 billion to $10 billion from the first quarter of this year to the final quarter of 1961, with 60 per cent of it at the state and local levels.

However, the retarded economic growth combined with the continual increase in the work force will result in even more serious unemployment in 1961 than at present, particularly in January and February, the chamber cautions.

Production Index Stable

Since midyear, STEEL's industrial production index has fluctuated only 8 points (exclusive of holiday weeks), showing the greatest stability since the first half of 1956. At a preliminary 150 (1947-49=100) for the week ended Dec. 10, the trend line (Page 91) is right where it started in the second half and where it was a month ago.

Pump MOLTEN METALS Faster Better WITH Gusher MOLTEN METAL PUMPS



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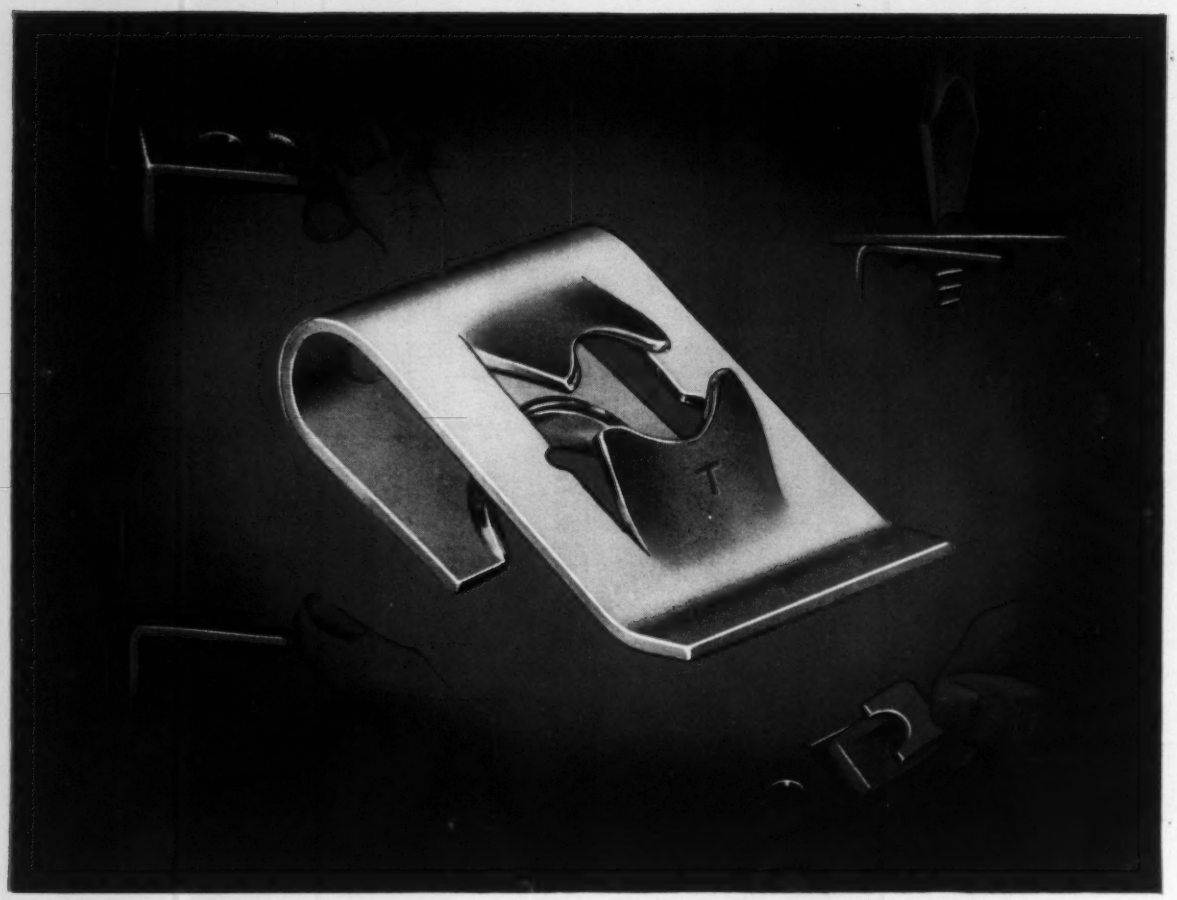

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SPEED NUTS are ideal for blind assembly or hard-to-reach locations. Apply them *before* you paint panels without danger of paint-clogging. Or *after* porcelainizing, without damage to finishes. The "U" type is similar to the "J" type, shown above, but is used where full bearing surface on the lower leg is required.

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A. E. NASH
Wolverine Tube operations

FRED J. ROBBINS
Bliss & Laughlin president

HOWARD W. BRANDT
National Malleable v. p.

JOSEPH I. ANDREINI
Mack Trucks plant mgr.

A. E. Nash was made director of operations, **Wolverine Tube Div.**, Allen Park, Mich., Calumet & Hecla Inc. He replaces **E. C. Walter**, recently named manager of the division's plant in Detroit.

Fred J. Robbins was elected president and chief-administrative officer of **Bliss & Laughlin Inc.**, Harvey, Ill. He has been vice president in charge of Pacific Coast operations since February when B&L acquired Sierra Drawn Steel Corp. and its mills in Los Angeles and Seattle. Mr. Robbins founded Sierra in 1947 and served continuously as its president. As B&L president, he succeeds the late **Arthur Lehr. Philip L. Ray** was elected chairman. **C. Arnold Kalman** was made chairman of the executive committee.

George H. Mettler was elected a vice president of **Textron Inc.**, Providence, R. I. He was president of **MB Electronics**, New Haven, Conn., a division of Textron Electronics Inc., and is succeeded by **Charles D. Brown**, former marketing manager of General Electric Co.'s Instrument Dept.

Foxboro Co., Foxboro, Mass., added a Marketing Div. to serve its associated companies in England, Canada, Holland, and Japan, as well as its U. S. market. **C. Schwarzler** heads the new division as vice president-marketing. **H. O. Ehrisman** was made vice president and U. S. general sales manager. **V. V. Tivy** was made director of engineering. He continues to head the company's Systems Engineering Div.

Howard W. Brandt was made vice president and group executive of **National Malleable & Steel Castings Co.**, Cleveland. For the last three years, he has been vice president of the Hydreco and Aurora Divisions of New York Air Brake Co. He previously was general manager, Rochester, N. Y., Div., General Motors Corp. Mr. Brandt will be in charge of the Industrial Div., as well as three subsidiaries: Grand Rapids Plating Co., Grand Rapids Die Casting Co., and Hill Hubbell Co.

A. Campbell Jr. was promoted to manager of sales and marketing services for **Thermoid Div.**, Pittsburgh, H. K. Porter Company Inc.

David W. Boyd was made executive vice president, **Engineering Castings Inc.**, Marshall, Mich. He becomes chief operating officer. **J. Raymond Mohlie** was made vice president and general manager. **Albert E. Rhoads**, president, continues as chief executive officer.

Joseph I. Andreini was made manager of operations for the Allentown, Pa., facilities of **Mack Trucks Inc.** For the last three years, he has served as vice president-manufacturing of Bucyrus-Erie Co. He previously was employed in a similar post with Pesco Products Div., Borg-Warner Corp., in Bedford, Ohio.

Bruce M. Shields succeeds **Earl W. Pierce**, retired, as chief metallurgist at the South Works (Chicago) of **United States Steel Corp.** Mr. Shields was chief metallurgist at the Duquesne, Pa., Works.

Arthur W. Thornton was made director of engineering and research, **National Tube Div.**, U. S. Steel Corp., Pittsburgh. He is succeeded as general superintendent of the division's Lorain, Ohio, Works by **William L. Fader**, former assistant general superintendent.

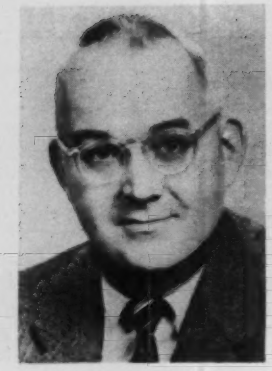
Jervis B. Webb Co., Detroit, appointed **John W. Thompson** chief

C. SCHWARZLER

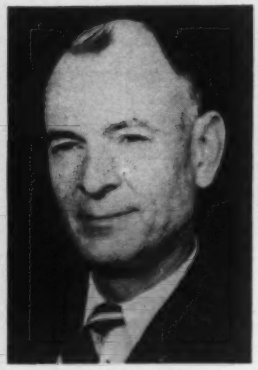
H. O. EHRISMAN

V. V. TIVY

Foxboro expands sales management



ARTHUR T. SCATTERGOOD



JAMES I. McMARTIN

Fenn Mfg. elections

JOHN S. HAMILTON

W. TURBEVILLE

Alcoa products sales managers

of research and product development.

Arthur T. Scattergood, vice president in charge of machinery sales for **Fenn Mfg. Co.**, Newington, Conn., was elected to the board. **James I. McMartin** was elected vice president in charge of engineering. He has been director of engineering since 1955.

Donald G. Bradley was named purchasing agent, Automotive Div., **Gabriel Co.**, Cleveland.

Karl Scheucher was made manufacturing development manager, Materials Dept., in the Tapco Group of **Thompson Ramo Wooldridge Inc.**, Cleveland. **S. A. Peterson** will assist him in staff manufacturing and process development.

Paul M. Nash was made manager of **Chrysler Corp.'s** Mount Road engine plant, Detroit. Since last August, he has been quality control manager for the Power Train Group.

John S. Hamilton was made manager-sheet and plate products sales for **Aluminum Co. of America**, Pittsburgh. Previously manager of aluminum foil products sales, he is succeeded by **W. Turbeville.**

Koehler Aircraft Products Co., Dayton, Ohio, subsidiary of New Britain Machine Co., appointed **Raymond LaFontaine** chief engineer for advanced products; **Harold Herkenhine** chief engineer for production products.

Kilsby-Tubesupply, Los Angeles, appointed **John B. Jones** operations manager. He was sales manager for Western Nipple Mfg. Co.

Walter T. Haswell Jr., works manager of **Latrobe Steel Co.**, Latrobe, Pa., was named vice president in charge of production to succeed **R. T. Eakin**, resigned.

Denis J. Bracken, former general manufacturing manager, Ford Div., **Ford Motor Co.**, Dearborn, Mich., was appointed general manager of Ford's new Automotive Assembly Div. Assembly plants were formerly operated by Ford Div.

James M. Dehn and **Theodore W. Sill Jr.** were made marketing managers of **Peter A. Frasse & Co. Inc.**, New York. Mr. Dehn's responsibilities relate to stainless and alloy bars, sheets, and plates; Mr. Sill's to aluminum products. **John E. Lennon** (assistant vice president-marketing) will handle all tubular products except aluminum.

J. L. Atwood was elected chief executive officer of **North American Aviation Inc.**, Los Angeles, to replace **J. H. Kindelberger**, who continues as chairman. Mr. Atwood is president.

Richard L. Shelton was made director of operations of Telecomputing Corp.'s **Whittaker Gyro Div.**, Van Nuys, Calif.

Willard Mason was made general manager, **Patterson Foundry & Machine Co. (Canada) Ltd.**, Toronto, Ont. **Robert Cantle** was named sales manager. Mr. Mason

PAUL M. NASH

manager of Chrysler plant

WALTER T. HASWELL JR.

Latrobe v. p.-production

DENIS J. BRACKEN

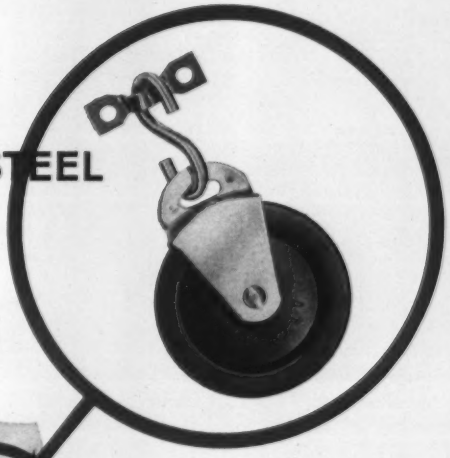
heads Ford assembly div.

WILLARD MASON

Patterson (Canada) gen. mgr.

A BOON FOR BOTH... WITH STAINLESS STEEL

Marine Hardware Manufacturer and Boat Owners Alike Benefit from HOUSE OF STAINLESS Metallurgical Service



Photos courtesy Shell Lake Boat Company, Shell Lake, Wisconsin and Attwood Corporation, Grand Rapids, Michigan.

Exploring the possibilities of using stainless steel to provide extra strength for their line of marine pulleys, Attwood engineers consulted with metallurgists at the House of Stainless. Tests resulted in the selection of a superior corrosion-resistant type of stainless that would work-harden during fabrication.

FOR THE MANUFACTURER, the change to stainless has meant: A product with outstanding strength. A more compact design because the inherent strength in stainless permitted use of lighter gauge material. Positive corrosion resistance under all conditions. And, because stainless eliminates costly plating and buffing operations, the manufacturer now realizes an over-all savings of more than 25%.

FOR BOAT OWNERS, the plus value of a stainless steel pulley body is reflected in greater safety through extra strength. Because there is no plating to chip or wear off, they get beauty, long service life and freedom from maintenance and corrosion.

No matter what your product or need may be, this kind of metallurgical assistance is available to you without cost at the House of Stainless. Complete warehouse stocks and mill deliveries of all stainless commodities back up our all-out service.

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Kildare Avenue at 45th Street, Chicago 32, Illinois
Mailing Address: Box 6308, Chicago 80, Illinois

Milwaukee District Office: 757 N. Broadway, Milwaukee 2, Wisc. Telephone BRoadway 3-7874
Sales Representatives at Bloomington and Rockford, Ill.; Indianapolis and South Bend, Ind.; Davenport, Iowa; Grand Rapids, Mich., Minneapolis, Minn.; Appleton and Wausau, Wisc.

YOUR DEPENDABLE SOURCE FOR CARBON AND STAINLESS STEEL; ALSO INCO ALLOY BAR, WIRE AND STRIP

EDWIN W. ZIPSE
United-Greenfield president

PAUL J. KUNKLER
Vaughn Machinery sales

GEORGE E. GUNTHER
joins Yale & Towne Mfg.

ALDEN HENSEL
Mueller Brass works mgr.

GLEN SCHUPBACH
Valeron div. gen. mgr.

HAROLD L. RUSSELL
Weston Instruments sales

was assistant to the general manager.

Alden Hensel was made works manager, **Mueller Brass Co.**, Port Huron, Mich. He was director of industrial relations.

Hamilton M. Ross was elected a vice president of **Hewitt-Robins Inc.**, Stamford, Conn., responsible for contract engineering operations in the U. S. and abroad. He is assisted by **Martin Vander Laan** as director of engineering sales, responsible for world-wide sales of bulk material handling systems. Mr. Ross is succeeded as manager of the Robins Conveyors Div., Passaic, N. J., by **Norman M. Godfrey**, former Eastern regional sales manager, New York.

Robert W. Breckenridge was made director of sales, **Industrial Technological Associates Inc.**, management consultant and engineering firm in Cleveland. He had been president of Breckenridge Machine Corp. since 1955.

Glen Schupbach was named general manager of **Valeron Corp.'s** new Press Brake Div. at Addison, Ill. **Nicholas Gron** was made chief engineer; **Albert Pilz** plant superintendent.

Harold L. Russell was made general sales manager of Daystrom Inc.'s **Weston Instruments Div.**, Newark, N. J. He was process instrument sales manager.

George J. Dickey was appointed vice president and assistant general manager, **Stromberg-Carlson Div.**, Rochester, N. Y., General Dynamics Corp.

Hevi-Duty Electric Co., division of Basic Products Corp., named **Robert M. Palmer** over-all field sales manager for its Industrial and Laboratory Furnace and Oven Divisions. **John C. Lavey** succeeds Mr. Palmer as manager, Eastern sales office. Mr. Palmer will operate out of company general offices in Watertown, Wis. **E. H. Andrus** was named field service manager.

United-Greenfield Corp., effective Jan. 1, elected **Edwin W. Zipse** president and chief executive officer, succeeding **Konstantin Kronwall. Jack C. Malugen** was elected executive vice president. Mr. Kronwall has resigned because of ill health, but will act as chairman of a special committee on research and development.

Paul J. Kunkler was made sales manager, **Vaughn Machinery Co.**, Cuyahoga Falls, Ohio. **Ralph B. Long Jr.** was named divisional sales manager, bar and tube drawing.

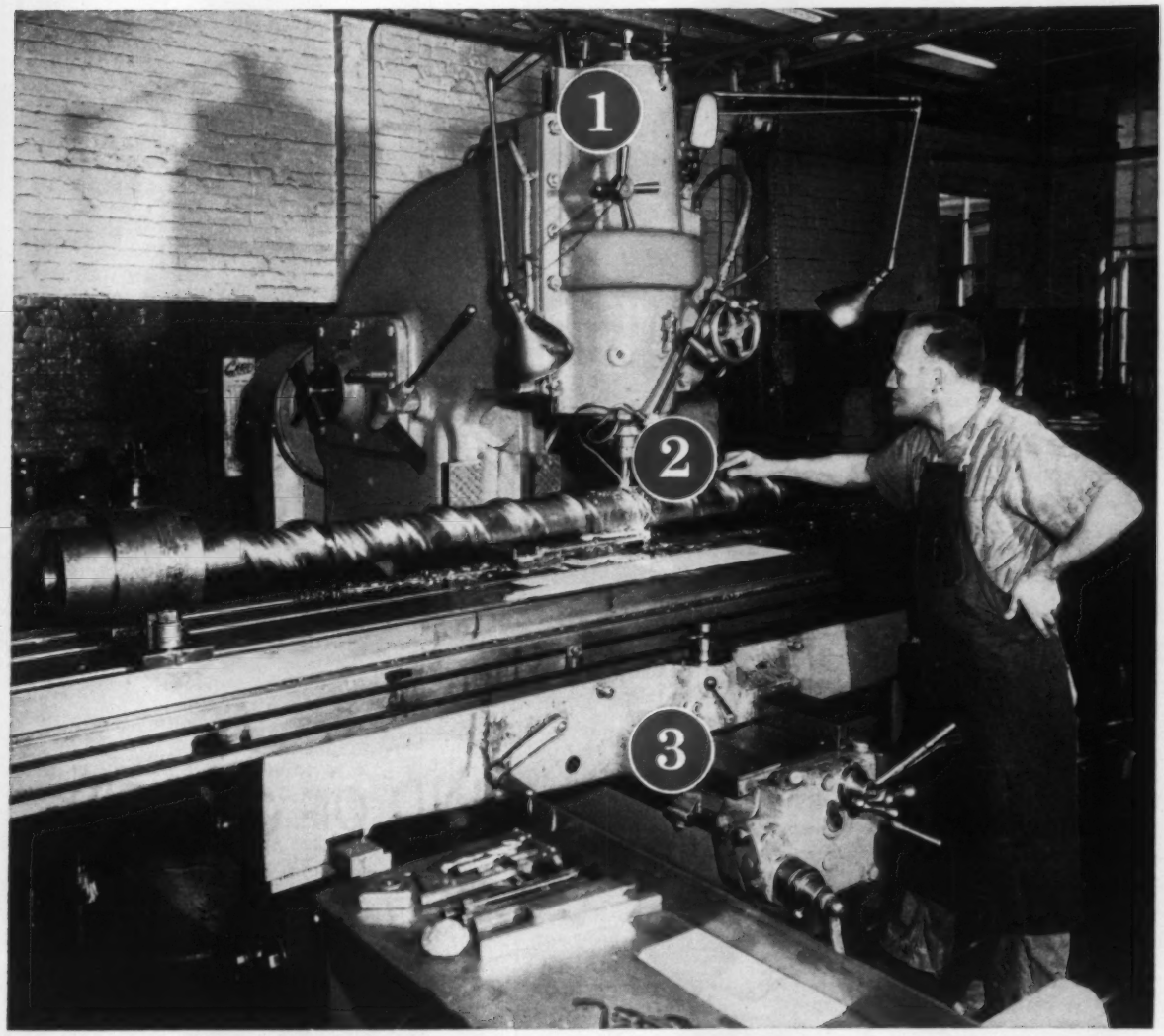
George E. Gunther was appointed domestic sales manager for the Trojan tractor shovel line of **Yale & Towne Mfg. Co.** at Batavia, N. Y. For the last 12 years, he was with Thew Shovel Co., most recently serving as sales manager-Western region.

T. Roland Berner, chairman and chief executive officer of **Curtiss-Wright Corp.**, New York, was given the additional title of president. He was named chairman and chief executive last May following resignation of **Roy T. Hurley** as chairman, president, chief executive officer. The presidency has been vacant since then.

Fansteel Metallurgical Corp., North Chicago, Ill., consolidated into one operating division its former Muskogee, Okla., Div., Chemical Div., and Metals-Fabrication Div. The new division is known as the Chemical & Metallurgical Div., and will be headed by **Ralph W. Rawson** as general manager. **Dr. R. Winchester**, former vice president-metal products, was made staff vice president to **E. T. Collinsworth Jr.** (executive vice president), and will assist Mr. Collinsworth in the chemical and metallurgical fields. Also appointed to the new division: **J. W. Rose**, sales manager; **Lyle L. Clark**, manager of manufacturing.

D. C. Fabiani was elected executive vice president of **Crane Co.**, Chicago. He was financial vice president of McDonnell Aircraft Corp., St. Louis.

George W. Herman was made manager of the Allison abrasive wheel plant of **Allison-Campbell Div.**, American Chain & Cable Inc., Bridgeport, Conn.



IMPROVING FEEDS AND FINISHES... WITH ESSO LUBES

1. NEBULA® EP GREASE helps bearings run true longer . . . maintains precision running of plain and anti-friction bearings. Exceptional for its stable consistency, oxidation resistance and load-carrying ability throughout a wide temperature range.

2. KUTWELL® EP 66 CUTTING OIL speeds fine finishes . . . increases tool life; permits higher speeds and deeper cuts. Leaves an easy-to-see film for highly efficient lubrication. Contains a bactericide to keep emulsions sweet smelling and serviceable for longer periods.

3. FEBIS® K LUBRICANTS insure smooth-sliding ways . . . boost precision by eliminating "stick-slip" movement. These lubes actually make static friction less than sliding friction; easily pass the stick-slip test.

There's a complete line of specialized Esso Lubricants to help improve your operations. Contact your local Esso office or write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, New York.

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In Industry after Industry..."ESSO RESEARCH works wonders with oil"

The "custom" approach to oil seal manufacture, pioneered by IPC, has resulted in some real off beat products.

None-the-less . . . they *work!* They suit the application *and,* in more cases than not, they have contributed substantially to cost savings.

When you're faced with a rugged problem involving oil seals, what synthetic compound comes to mind? How about case design? . . . friction? . . . torque? . . . shaft speeds?

Oil seals are an engineered product in themselves . . . just as good as their individual design. That's why we think each oil seal application deserves special "custom" thinking. That's why IPC oil seals are noted for performance. Let us show you what IPC can do to relieve your particular problem.

OIL SEALS / PACKINGS / PRECISION MOLDING *Custom designed for your application.*

IPC

INTERNATIONAL PACKINGS CORPORATION

Bristol, New Hampshire

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P-1

Tin Plate Product Line Broadened at Irvin Works

A CONTINUOUS ANNEALING line for heat treating thin, sheet steel for tin plate will be constructed at U. S. Steel Corp.'s Irvin Works, Dravosburg, Pa.

"This modern continuous annealing, coupled with our present box annealing and other tin plate finishing facilities, will enable the Irvin Works to provide every type of tin plate product now required by can manufacturers," says A. T. Duff, general superintendent.

He points out that customers will be required to stock fewer tempers of tin plate because "our product will be suitable for use in a wider range of applications than ever before."

• **Process Details**—In the continuous annealing process, coils of tin plate are fed into the facility at a rate of 1500 fpm. Electrolytic cleaning apparatus removes all traces of lubricants used in cold rolling.

The steel next moves into the heating section where it is protected against oxidation by a controlled atmosphere. It is quickly heated to as high as 1350° F, then cooled. At an operating speed of 1500 fpm, less than 2 minutes elapse from the time a given section of the steel enters the heating zone to the time it leaves the cooling zone.

The annealing line is equipped with looping towers which provide reserves to reduce delays when new coils are fed into the facility and when annealed coils are discharged. After annealing, the treated steel is temper rolled, side trimmed, and coated with tin in the Ferrostan, electrolytic tinning lines. Tin plate is produced in coil and cut sheet form.

Armco Chile S. A. Formed

Armco Chile S. A. has been formed by Armco International Corp., Middletown, Ohio, and Compania Electro Metalurgica S. A., Santiago, Chile, to produce alloy grinding balls. Oscar Pardo, manager of Armco Chile, says remaining work on the plant consists of setting up and starting machinery and equipment for processing the balls. The plant is adjacent to Compania de Acero del Pacifico S. A., which will supply the steel requirements for the new company. The Chilean copper companies are expected to use substantial tonnages of the balls in the processing of Chilean copper ore.

Bullard License in India

Bullard Co., Bridgeport, Conn., has licensed Kirloskar Bros. Ltd., South Satara, India, to build Bullard, vertical turret lathes and horizontal boring machines. The firm has also been appointed sales agent for other Bullard machine tools in the Far East.

Adds Color Coating Line

National Steel Corp., Pittsburgh, says installation of 1300 ft of highly mechanized and automated production lines for color coating, pre-engineered steel building components will be completed at its Stran-Steel Div. plant in Terre Haute, Ind., this month. Production capacity of the new facilities will be more than 1 million ft of material a week. About 600 ft of the finishing facilities are allocated to volume production of color coated roofing and siding panels from continuous coil stock. About 700 ft of the facilities are allocated to color finishing steel building winrows and decorative parts.

Corporate Names Changed

Glenn Pacific Power Supply Corp., Oakland, Calif., has changed its name to Glenn Pacific Corp. The company makes welding and industrial power supplies.

Titan Metal Mfg. Co., a division of Cerro de Pasco Corp., Bellefonte, Pa., will drop "de Pasco" from its corporate name Jan. 1.

Milwaukee Electronic Expeditors Inc., Milwaukee, changed its name to Electronic Enterprises Inc.

Budd Co., Philadelphia, changed the name of its Canadian subsidiary, Tatnall Measuring & Nuclear Systems Ltd., to Budd Instruments Ltd. The Canadian offices have been moved to 170 Donway West, Don Mills, Ont.

Hardinge Enlarges Foundry

Hardinge Mfg. Co., York, Pa., has completed its $300,000 foundry modernization and expansion program. Improvements include: A plant addition, a motive sand slinger, enlarged cupola charging floor, new core ovens, new sand muller, automatic sand handling and sand storage system, and complete paving of the outside storage area. The foundry embraces 32,000 sq ft of floor area and has a nominal capacity of 250 tons a month, which can be increased with additional personnel.

Furnace Work Progresses

The second of two huge steelmaking furnaces is being swung into position at the Cleveland Works of Jones & Laughlin Steel Corp., Pittsburgh. They have a rated capacity of 200 tons an hour and are part of a new basic oxygen furnace shop being constructed during modernization of facilities at Cleveland. Each of the furnaces, expected to go into production in mid-1961, weighs 132 tons, is 50 ft high with its supporting structure, and 25 ft wide. Both were produced by Pennsylvania Engineering Co., New Castle, Pa.

Rock Falls Plant to Close

Farm Equipment Div., International Harvester Co., Chicago, will concentrate its manufacturing in its more modern and efficient facilities. Farm implements produced at its Rock Falls, Ill., plant will be transferred to the Canton, Ill., factory and to West Pullman Works, Chicago.

The Canton Works will transfer its gray iron production to Harvester foundries at Rock Island, Ill.; Hamilton, Ont.; Indianapolis; Louisville; and Milwaukee. This will make available about 125,000 sq ft of additional floor space for anticipated production needs at Canton.

The program will be completed

by the end of 1961, says Mark V. Keeler, vice president of the division.

Lawson Buys Heater Line

Lawson Mfg. Co., New Kensington, Pa., purchased the Hoffman Water Heater Div. of Clayton & Lambert Co., Louisville, thereby increasing its facilities by 60 per cent. Lawson is a subsidiary of Wilson Bros., New York and Louisville.

Stamping Plant Enlarged

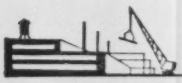
Fisher Body Div., General Motors Corp., is adding 214,000 sq ft of floor space to its stamping plant at Hamilton, Ohio. The 17 per cent expansion will cost about $10 million. Construction is scheduled to be completed by next fall.

Poor Controls Mobiweld

Poor & Co., Chicago, acquired a majority interest in Mobiweld Inc., developer of a rail welding process that can be moved from site to site or operated in a fixed location. Mobiweld will have its offices at 80 E. Jackson Blvd., Chicago.

Mexican Company Formed

Controles Automaticos S. A. has been organized in Monterrey, Mexico, to produce the line of controls of the Fisher Governor Co., Marshalltown, Iowa. President of the Mexican firm is H. Santos Jr.

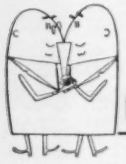


NEW PLANTS

Copper & Brass Sales Inc., Detroit, opened a metal service center at 5755 Grant Ave., Cleveland. The 35,000 sq ft building more than doubles the floor space of the previous center. The firm distributes aluminum, magnesium, stainless steel, copper, and brass products. Equipment includes shearing and slitting facilities, a precision plate saw, vacuum lifts, and hydraulic dock levelers.

Ajax Composite Die Co., Detroit, is constructing a plant at 19181 Glendale Ave., that city, which will more than double the firm's facilities for production of composite die sections. The 13,000 sq ft facility is scheduled for completion about Feb. 1.

Macomber Inc., Canton, Ohio, will establish production facilities at Kaiser Steel Corp.'s fabricating plant in Montebello (Los Angeles) Calif. The plant will be operated by Kaiser. Macomber will furnish the special equipment needed for the production of its high strength, cold roll, formed V-section. The Canton firm produces open web steel floor and roof framing members.



CONSOLIDATIONS

Parker-Hannifin Corp., Cleveland, purchased **Span Brass Mfg. Co.**, Otsego, Mich., and **Spanco Brass Sales Co.**, Allegan, Mich. The two companies will be operated as the Spanco Brass Co., a division of Parker-Hannifin Corp. The division makes low pressure brass fittings. Floyd Burge is general manager.

International Silver Co., Meriden, Conn., purchased **Eastwood-Nealley Corp.**, Belleville, N. J., manufacturer of bronze and brass Fourdrinier wires, also cylinder and filter wires.

Rockwell Mfg. Co., Pittsburgh, acquired **Porter-Cable Machine Co.**, Syracuse, N. Y., and will operate it as a subsidiary. Porter-Cable makes portable electric power tools.

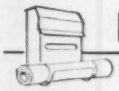
Magnaflux Corp., Chicago, a subsidiary of General Mills Inc., Minneapolis, acquired **Metal Control Laboratories**, Los Angeles. Magnaflux is among the pioneers in nondestructive test methods, materials, and equipment. Metal Control Laboratories is primarily involved in metallurgical, chemical, and mechanical testing.

Schaevitz Engineering, Pennsauken, N. J., acquired Smith & Macgeorge, specialist in the development of electronic instruments at Norristown, Pa. William D. Macgeorge has been named vice president-engineering of Schaevitz Engineering.

Addressograph-Multigraph Corp., Cleveland, acquired **Emeloid Co. Inc.**, Hillside, N. J., and will operate it as a subsidiary. Officers of Emeloid include W. C. Lowney, vice president and general manager; J. S. Freundlich, vice president-distribution; and W. D. Leeds, vice president-production.

Crane Co., Chicago, acquired **Cochrane Corp.**, Philadelphia, manufacturer of water treating equipment, deaerating heaters, and special equipment. Cochrane also makes steam, filtering, and control specialties and custommade, heavy, carbon steel and alloy equipment.

Crane Ltd., London, a subsidiary of Crane Co., Chicago, purchased **Tylors Ltd.**, Burgess Hill, Sussex, England, producer of meters for water and industrial liquids.



NEW ADDRESSES

Austin Co., Cleveland, transferred the headquarters of its international engineering and construction organization to 3650 Mayfield Rd., Cleveland Heights, Ohio.

Jowitt & Rodgers Co. moved into a new plant at 9400 State Rd., Philadelphia, Pa., doubling the firm's facilities. The company makes surface grinding wheels, segments and discs for the metalworking field and tobacco manufacturing industry.

New Britain Machine Co., New Britain, Conn., will move its Indiana-Kentucky-Ohio sales office to 401 Leo St., P. O. Box 65, Dayton 4, Ohio. The new quarters will be in the plant of New Britain Machine's subsidiary, Koehler Aircraft Products Co.

Scientific & Process Instruments Div., Beckman Instruments Inc., Fullerton, Calif., moved its Buffalo regional sales office to 2451 Wehrle Drive, that city.

Air Reduction Pacific Co., a division of Air Reduction Co. Inc., San Francisco, moved its Portland, Oreg., sales, service, and warehouse facilities into larger quarters at 1325 N.W. Kearney St., that city.

who cares about the freezing process . . . *as long as it tastes good? Many production men, understandably enough, share the viewpoint of this small-fry. It doesn't matter how steel freezes in the ingot mold, just as long as the bar and strip and wire and other shapes perform well. Other than steelmakers, who should care about uniform material? You should care if you've ever run into trouble with stainless or high temperature alloys or tool steels. For higher reject rates, premature part failure, shortened tool and die life, increased production costs, and dissatisfied customers . . . all can be traced directly to the ingot. An ingot of weak structure or poor composition can mean trouble in every piece of steel that comes from it.*

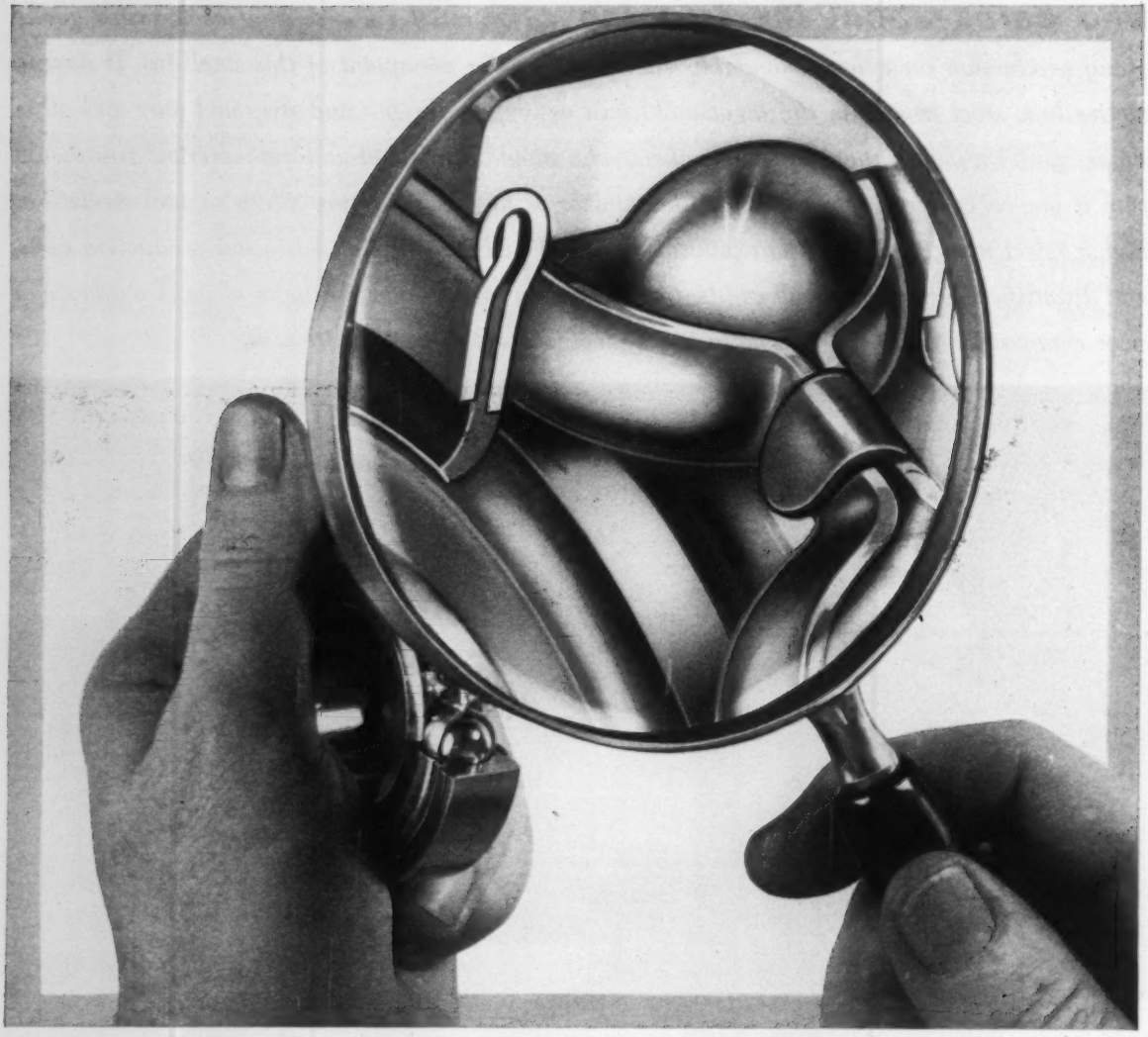
That's why we say the exclusive MEL-TROL® process goes a step beyond quality control. It includes a new patented mold which controls the freezing process . . . forces impurities to the top of the ingot where they can be cut off and discarded. This MEL-TROL ingot is more uniform . . . freer from segregation. You get clean, sound, tough metal from surface to core in every lot of steel you order. Specify Carpenter MEL-TROL steels and avoid trouble in the future. Then you, too, can enjoy the luxury of saying: "I don't care how they make it as long as it performs so well!"

Carpenter steel

you can do it ***consistently*** better with Carpenter specialty steels for specialists

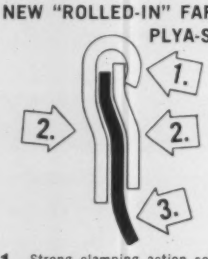
Steel

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.



New FAFNIR seal in a "steel sandwich" stays put... seals better!

NEW "ROLLED-IN" FAFNIR PLYA-SEAL



1. Strong clamping action secures seal in bearing.
2. "Steel sandwich" provides rigid seal support, prevents push-in.
3. Tough, Buna-N rubber-impregnated fabric Plya-Seal offers "best protection yet" against contaminants, fumes, moisture.

Notice the steel supports on both sides of the seal in this Fafnir ball bearing. The seal is held by clamping action from the rolled-in, firmly wedged supporting members.

This new Fafnir seal design is engineered to prevent seal push-in, and to assure positive anchoring of the seal in the bearing. Protection against contaminants is increased . . . lubricant is more effectively locked in. Sealing is further improved by the "baffle action" of the inner steel support, and the lip-in-groove design of the seal itself.

Fafnir ball bearings with new, "rolled-in," nonremovable Plya-Seals are now available in a wide range of sizes and in Fafnir power transmission units.

FAFNIR
BALL BEARINGS

THE FAFNIR BEARING COMPANY
NEW BRITAIN, CONN.
Please send me more information on sealed and shielded bearings.

NAME ..... TITLE .....
COMPANY .....
STREET .....
CITY & STATE .....

IMPROVING GATING DESIGN— A 12 year study by John Kura, Battelle Memorial Institute, Columbus, Ohio, indicates that scientific principles can improve gating systems in castings. His system features: 1. A pouring basin to keep out dross. 2. Tapered sprues. 3. A well beneath the sprue to prevent erosion. 4. Gates off the top of the runner. 5. A runner extended beyond the last gate. 6. Streamlined channels throughout to reduce turbulence.

METAL DOUGHNUT— The new atom buster at Argonne National Laboratory, Argonne, Ill., will contain eight steel magnets weighing 5000 tons (total). A central building will house 144 mercury arc rectifiers to supply power. Official name of the reactor: ZGS, which stands for zero gradient proton synchrotron.

MOLECULAR WEIGHT WATCHER— Measuring the molecular weights of small amounts of unknown materials in solution is said to be a cinch with a new device which uses thermistors in an electronic circuit. Drops of solution and solvent are placed on separate bead thermistors in a chamber saturated with solvent vapor. Temperature changes that take place are a measure of the molecular weight of the unknown sample, states Stanford Research Institute, Menlo Park, Calif.

STICKY STAINLESS— Sticky backed stainless steel foils up to 24 in. wide are being made by Fasson Products Div., Avery Adhesive Products Inc., Painesville, Ohio. The adhesive gets tougher with age—75 per cent stronger after three days—and resists grease, oil, acids, and alkalies, the company says. Applications include architectural decorative panels, furniture, and decorative trim.

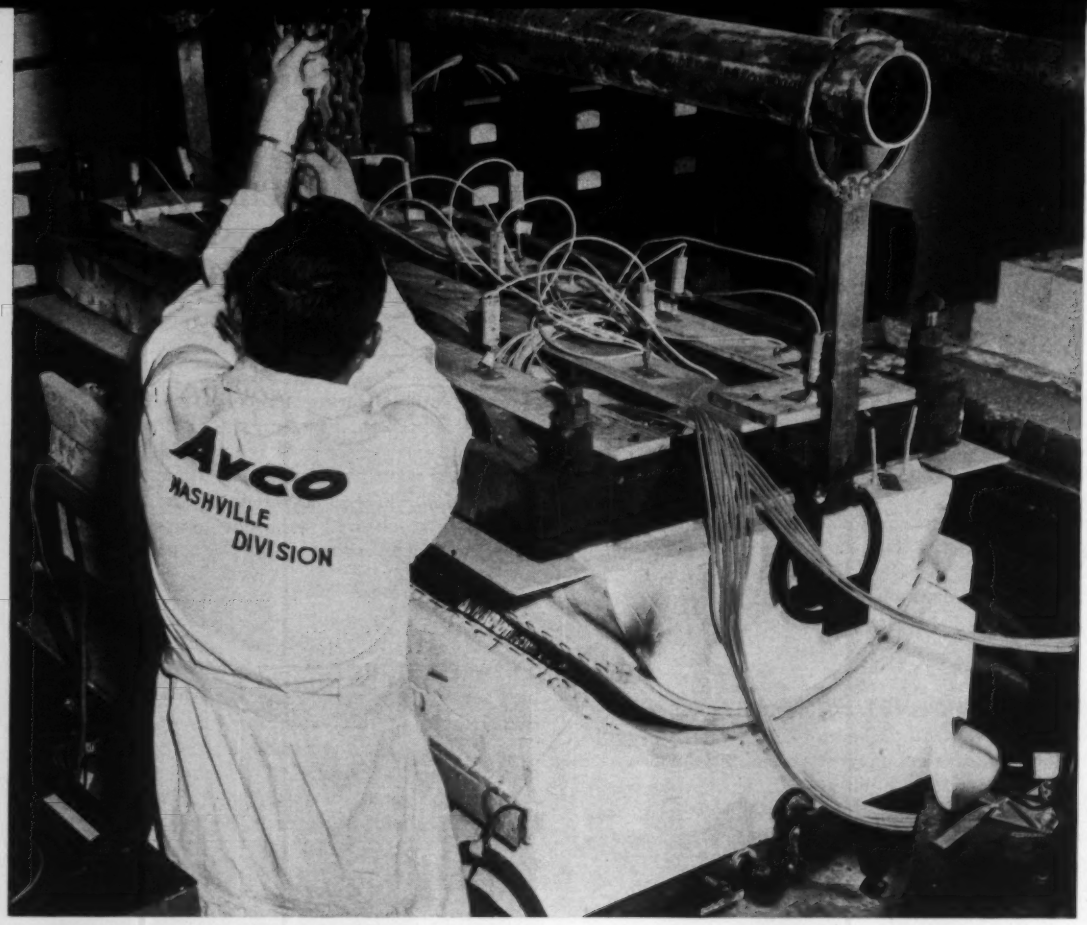
REFRACTORY METAL PROGRESS— In a recent study of the mechanical properties of molybdenum and columbium, Boeing Airplane Co., Seattle, successfully blanked and sheared sheets of those metals. The firm recommends: 1. Best blanking and shearing temperature for molybdenum-0.5 per cent titanium is 200° F with a die clearance of 4 per cent of material thickness for blanking, 5 per cent for shearing. 2. Commercially pure columbium (up to 0.040 in. thick) can be blanked and sheared at room temperatures. 3. Shop equipment should be in top condition for best results.

CHEAPER STRUCTURALS— U. S. Steel Corp. has a new, low cost alloy steel for structurals that is said to offer significant savings. Called "T-1" Type A, it has the same strength (100,000 psi minimum) as regular "T-1" when it is 3/16 to 1 in. thick, but it costs less because of basic differences in chemistry, says U. S. Steel.

ANOTHER STRUCTURAL— A Canadian firm, Algoma Steel Corp. Ltd., Toronto, says its new structural steel (CSA-G40.8) is cheaper, stronger, and easier to fabricate than standard grades of structurals. "In some structures, it could cut weight by 12 per cent," the firm claims. It has a guaranteed minimum yield of 40,000 psi, and 20 per cent less metal will carry the same load as corresponding material of the old specification, officials say.

AUTOMATIC WAFER GRINDING— A grinding machine manufacturer is working on a machine that will automatically grind the surfaces of parts only 0.030 in. thick to extreme size and flatness tolerances. The key market is expected to be the electronics industry.

RUSSIAN ENGINE PLANS—A four cylinder, aluminum engine with a 146.5 cu in. capacity will be diecast (in an Italian machine) by Russians along about the end of the year, STEEL sources claim. Cylinder sleeves will be installed after casting. It is said to be the first water-cooled aluminum block to be tried in Europe (Volkswagens and Porsches are air cooled).



Single fixture tool with ceramic heating element cuts honeycomb costs. Now . . .

New Jobs Sought for Brazing Platens

EXPERIENCE with unitized tooling and ceramic brazing elements that cut costs in making stainless steel honeycomb panels for XB-70s at Avco Corp.'s Nashville, Tenn., Div. has suggested greater potential for the process.

One potential use for the method (STEEL, Aug. 22, p. 41) in the honeycomb field: Hot forming close tolerance sheet stock or components for panels by using only one-half of the tool now employed.

• The process could be applied to other types of manufacture.

"We think it is applicable for producing more complex basic configurations, such as cylinders, cones, and hemispherical shapes; also tubular truss structures for generating airframes and space structures," says Avco.

"Conventional industry will find the unit advantageous where it must braze or perform similar functions on short production runs."

• In a time comparison, single unit tooling won out at Avco by about 10 hours (26 1/3 vs. 16 7/12 hours) over the furnace technique of brazing.

The furnace system included 5 hours in a brazing furnace, 14 hours in a forced air cooling and refrigeration chamber, and 6 2/3 hours back in the brazing furnace. Handling between steps took 20 minutes.

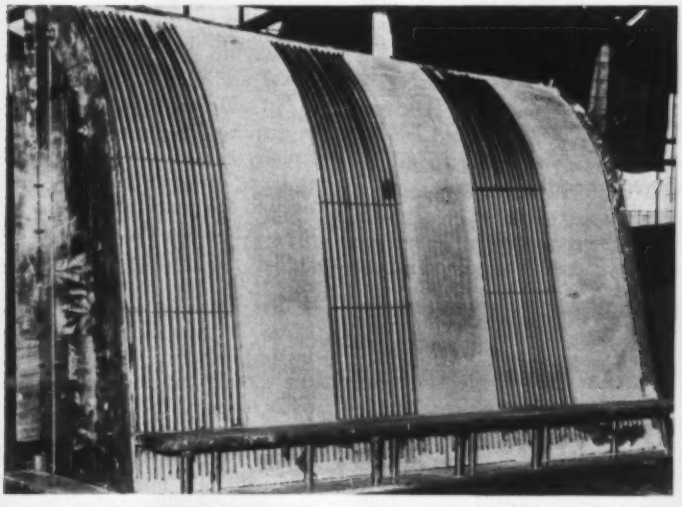
The single set of fixtures carries the stainless panels through brazing, cooling, subzero conditioning, and aging cycles, minimizing handling.

• Key to Avco's success is the ceramic it developed.

It's a silica base material that can be easily shaped by cutting or grinding tools. It has excellent thermal shock resistance up to maximum operating temperature, a low coefficient of expansion, is easy to cast to accurate contours, has good workability, and is simple to repair. Currently the Avcoramic tools can take a 2100° F operating temperature. Developments under way are expected to push this up to about 3000° F.

The original work on the ceramic was done by Avco's Dr. Scala at the Research & Advanced Development Div., Wilmington, Mass.

Ceramic platen can be quickly formed for short runs



And integral tubing saves time in cooling

Since then the Nashville division has developed Avcoramic ceramics which may be applied by trowelling on any type of reference form (as opposed to the conventional method of casting the ceramic in a mold).

Position of reference forms may vary from flat to near vertical.

• The company claims the process makes a better sandwich structure, faster and at less cost.

Facilities: Unitized tooling provides an independent, complete cycle for each configuration. It avoids low utilization of expensive capital facilities such as single, large furnaces. The tooling can produce 10 to 20 reproductions. The maximum is pegged at about 50.

Heating system: The sandwich structure is heated and cooled from both sides. Heat input and extraction can be controlled for varying thermal masses by zoning heating elements and coolant passages. The process has rapid heat up characteristics and can be started off at room temperature to avoid thermal shock. The high insulating value of platens and backup minimize waste of heat energy. Heating elements (Nichrome) are easily replaced in ceramic platens. Repair presents no problem. Latest developments in cooling make possible the extraction of heat from brazing temperatures to 1000°F in a matter of minutes.

Temperature control: Thermocouple leads are relatively short, even for large panels. This improves calibration and reliability. Leads are accessible and replaceable even during the process cycle.

Contour accuracy: Avco claims maximum accuracy by retaining the sandwich structure in the tool throughout the entire process. Low expansion of the Avcoramic platens avoids warping of the tooling reference plane. It's accurate to 0.003 in.

• Scrap losses are low with the Avco System.

Scrap is a considerable factor in the cost of the finished product, says Harold J. Black, director of Engineering.

Areas 10 x 20 ft can be produced. The company says size is of no great concern provided adequate backup and reinforcing structure is available. Besides stainless, the tooling process can work with other problem high temperature alloys such as Inconel, Rene 41, A286. In addition, the process is not confined to brazing sandwich structures.

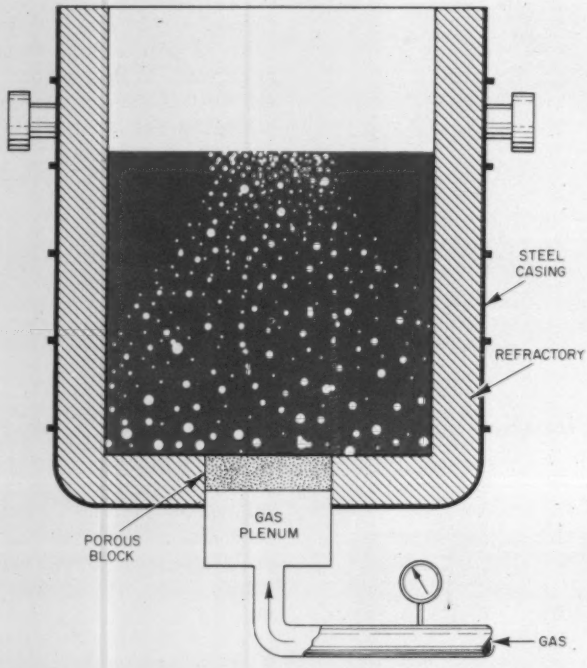
New Graphite Formula

Graphite particles bonded with carbon are said to be ideal for parts which must operate in air at 1200°F.

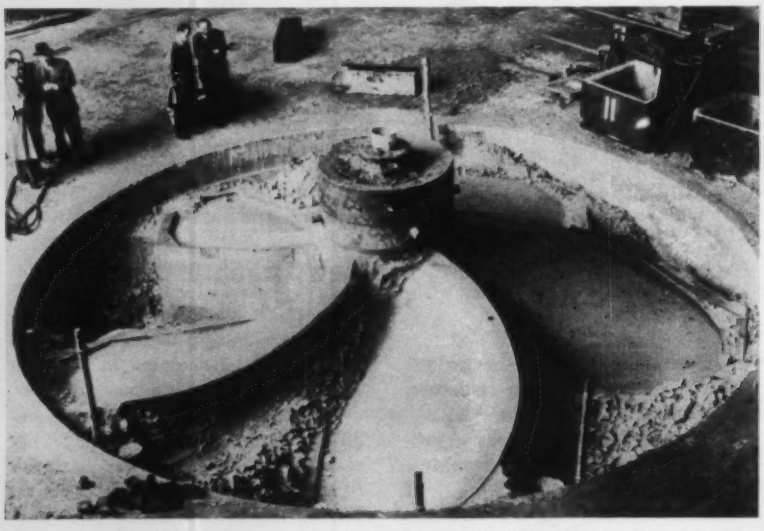
The material has a lower coefficient of friction, better wear resistance, and greater stability than previous formulations, claims United States Graphite Co., Saginaw, Mich.

Porous Refractory Used In Gas Treatment of Metal

Fine bubbles of gas are dispersed through a ladle of molten metal by means of a plug of porous refractory. It has been used for flushing hydrogen from nonferrous materials, providing agitation for speeding slag-metal reactions, mixing ladle contents



Schematic diagram shows how gas forced through porous plug is dispersed through the molten metal. Plug prevents backflow of melt



Cast bronze propeller, from gas treated heat, weighs 70 tons

HERE'S ANOTHER method for treating molten ferrous and nonferrous alloys: The Gazal process, developed by Canadian Liquid Air Co. Ltd., Montreal, Que. Flushing gas is passed through a porous plug of ceramic material in the bottom of the ladle to improve the efficiency of hydrogen removal, for example.

The process was originally developed (by Dr. E. Spire and Robert Lee) to meet the problem of "wild heats," which cause porosity in castings, but it has been applied to homogenizing a metal bath and speeds up the reaction between metal and slag.

No additional ladle time or labor is required because the process is usually carried out while the ladle is being transported from the furnace to the pouring floor, says Frederick Schneider, the company's manager of technical development.

• **Gas Flushing** — Hydrogen, the cause of the wild heats, is removed by bubbling an inert gas through the metal. As the bubble rises, it picks up some of the hydrogen, carries it to the surface of the melt where it escapes, along with the inert gas. To obtain fine bubbles, providing the maximum surface in contact with the metal and the most efficient use of the inert gas, the flushing gas is passed through the porous plug. Silicon carbide or aluminum oxide types of refractory have been employed.

The fine channels in the porous plug prevent the metal from penetrating but permit passage of the gas, using pressures in the 40 psi range. Higher pressures, as would be expected, result in greater gas flow. Stopping of the gas flow

would not permit the metal to enter the plenum chamber.

• **Good Mixer**—Gas treatment also causes thorough mixing of the metal, preventing local differences in composition. So the process has been used in the manufacture of alloy steels to eliminate segregation. At the same time, degassing takes place, and temperature differences are minimized.

Gas agitation has also been used to promote reaction of the metal bath with the slag for refining. Reaction between the two layers depends on the amount of surface in contact; the agitation promotes increased surface area and lifts the bottom metal toward the top. Dependence on diffusion alone is less effective. So the Gazal process has been used in the desulfurizing of iron and steel by reaction with a suitable slag.

The combination of degassing and mixing has been used in the casting of a 70 ton bronze propeller, for the degassing of SAE 52100 steel, and in the manufacture of steel for tin plate, reports the company.

Gases most commonly used are nitrogen and argon, although active gases have been employed. Because of the lower cost of nitrogen (compared with argon), it is used where possible. But with molten steel, pickup of nitrogen is usually objectionable, so argon is chosen. Aluminum and copper alloys require nitrogen, and in the case of aluminum, a small amount of chlorine is occasionally added. Any gas must be extremely dry; moisture would react with the molten metal to form undesirable hydrogen, defeating the purpose of the treatment.

Operating conditions and the metal determine the amount of gas used as well as its composition. Mr. Schneider cites as typical 4 to 6 cu ft of gas per ton of steel and 20 to 25 cu ft per ton of aluminum. He warns that metals which are gassy because of insufficient deoxidation will not be improved by flushing, and the process won't prevent porosity when it is caused by reaction with the metal and the mold material. It does, he feels, offer an effective method for removal of hydrogen, stirring a melt, and promoting a metal-slag reaction.

In checking phosphate coating on a bushing cylinder . . .

Probe with 2 Gram Pressure Prevents Marring of Finish

A FEATHER touch of a stylus eliminated problems in measuring surface finish at Target Stamped Products Corp., Kinsman, Ohio.

In the past, finish checks of metal coatings were difficult to obtain with an instrument because the stylus pickup had a tendency to scratch through soft coatings and deliver incorrect readings.

Visual or hand checks became obsolete as finish requirements became more stringent.

Manufacture of metal cylinders for bushings at Target requires that the phosphate coating on the cylinders be neither too smooth nor too rough. If the cylinder is too rough, it's impossible to inject rubber past the rough surface, but the surface must be rough enough to provide a gripping surface for the rubber.

• **The measuring instrument is a Brush Instruments Surfindicator with a maximum stylus force of 2 grams.**

Thirty different types of bushing cylinders are checked at Target for surface finishes which must be maintained within a tight range. Finish ranges are 50 to 70, 70 to 90, and 90 to 125 microinches.

Samples from every batch are checked by the foreman who controls the phosphate coating process. All samples are also checked by the final inspector before any shipment is made.

During coating, the parts are tumbled slowly to avoid continuous surface to surface contact and permit all surfaces to be uniformly covered. Finish of the inside diameter is checked with the standard motor driven probe of the Brush Surfindicator. Stroke of the probe is 1 in. The coated cylinders also undergo 100 per cent inspection when they are received by the bushingmaker.

Inspector checks for flaws on the inner surface of hydraulic line tubing. Light held at the opposite end makes minute imperfections easier to detect

Inspection Is the Key to Welded Tubing Acceptance

Meticulous examination of inbound skelp, complete quality control during fabrication, and a careful last look at the finished product insure the strength and uniformity needed in hydraulic fluid lines and cylinders

YOU CAN build premium performance into a product by:

1. Specifying flawless material, then testing it to make sure you get what you ordered.
2. Designing fabrication procedures and processes to keep out imperfections; test the product during each operation—or at its conclusion.
3. Setting final inspection standards well above those required by the customer—then meet those standards.

Such emphasis on quality control is helping the Tubular Products Div., Babcock & Wilcox Co. produce carbon steel, welded tubing with the strength needed for hydraulic fluid lines and cylinders.

Anticipating increased demand, the company is spending more than half a million dollars to expand welded tubing facilities at its Keystone plant in Alliance, Ohio.

• Tight physical and chemical control of steel—from the melt shop to the forming rolls—insure the best possible welded seams.

"Skelp coming into the Keystone plant represents the full width of a rimmed steel ingot," says one company official. "We like to use rimmed steel because it makes for a superior finish, and we avoid slitting to prevent the joining of rim and core material at the seam. A thin ribbon of steel is taken off by side trimming—to insure smooth surfaces for welding—but none of the core material is in the welded area."

Incoming skelp is sampled and chemically analyzed. Then the coils are loosened, pickled, and dried. If seams, slivers, or similar imperfections are being encountered in the mill, skelp is carefully inspected before it is recoiled and sent through the tubemaking operations. The pickled, dry surface is said to be ideal for detection of flaws, and for checking skelp thickness.

Strip is welded into a continuous strand for processing. Holes are punched in the material near the transverse weld to insure discard after tubing is made.

Skelp is forced into tubular form as it passes through forming rolls. The seam is resistance welded as the material passes between disc-type electrodes. Flash is trimmed from inner and outer surfaces of the tubing as it leaves the seam welder.

• Ultrasonic and magnetic particle inspection equipment cull out sections of tubing that contain imperfections.

Before tubing is cut into lengths, it passes over a small immersion tank containing an ultrasonic crystal. Ultrasonic indications are monitored on an oscilloscope screen. Imperfections in the welded seam are noted by oscilloscope "pips," dye squirted on the tubing, a buzzer, and a flashing light.

Tubing defects indicated by ultrasonic test are rechecked—unless the product is obviously below stand-

Immersed ultrasonic crystal and oscilloscope (left) permit continuous monitoring of seam weld quality

Ultrasonic flaw indications are double checked by magnetic particle examination under ultraviolet light

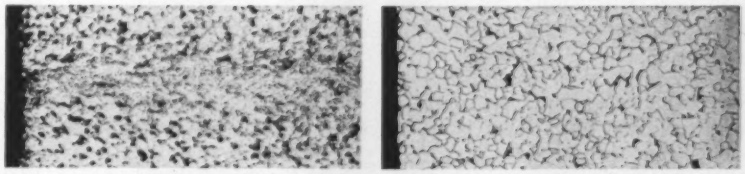
ard—by magnetic particle inspection or by deformation tests. A log kept by the mill inspector on each piece of tubing tells how it rated in the various tests, such as deformation (flare, flange, flattening, and reverse bending), or magnetic particle examination. The log is kept on file for years after tubing is shipped.

• Steel in the weld area is homogenized—and quality control continues as tubing is finished for shipment.

After mill inspection, the tubing goes through normalizing furnaces to eliminate the difference between the weld area and the body of the tubing. It is given a bright finish for hydraulic line applications, or a gunmetal finish if it is to be used as pressure tubing. The normalized product, with a hardness of 50 to 65 Rockwell B, is said to be well suited for subsequent drawing.

If the tubing is shipped in the normalized condition, it is straightened, cut to length, and chamfered; specification tests are performed. Then the tubing is hydrostatically tested, visually inspected, and checked for correct dimension.

Tubing that is cold drawn before shipment is pointed, cleaned, pickled, phosphated, and lubricated. Then it is straightened and processed for delivery in the same manner as the normalized product.



Photomicrographs show weld area before (left) and after normalizing

Tubing flattened and flared in deformation tests is examined by Vincent R. Barrord (right), manager of development sales, and Associate Editor Neil Roberts of STEEL. Below: Progressive steps in the flattening and expansion tests

Boeing's Tests Crop Tool Costs

PAY A PREMIUM for special grade cutting tools, and you may well be buying the simplest, least expensive solution to some costly machining problems. Or the extra dollars you pour into the cutters may be a total waste. The difficulty is that you probably have no way of knowing for sure unless your engineers run some simple tests.

A case at Boeing Airplane Co., Seattle, illustrates the point and shows how the tests can be made to pay off.

Machinists at Boeing do a lot of work on tough, high strength, high temperature alloys. For such jobs, they had turned to the cobalt grades of high speed steel for their cutting tools.

The tools cost Boeing about three times as much as standard HSS tools, but nearly everybody assumed that their superior properties paid off on the problem jobs.

Some engineers who questioned the superiority of the cobalt grade decided to measure its performance and compare it with that of standard HSS tools.

• At Boeing, cobalt grades outperformed standard grades when cutting tough materials at relatively high speeds. That was expected. But at slower speeds, the less expensive standard grades outperformed the premium materials.

The tests were run on endmilling cutters. The workpieces were forged Udimet 500, solution heat treated and aged to 39 Rockwell C. Boeing's W. J. Maxson, research engineer, manufacturing development section, Aero-Space Div., reports that at 37 surface feet per minute, the cobalt grades were superior, but at a cutting rate of 19 sfpm, the standard grades did better, and for jobs run at these removal rates, the premium paid for cobalt grades would not be justified.

• Six different brands of cobalt-grade cutters and three brands of standard HSS cutters were evaluated.

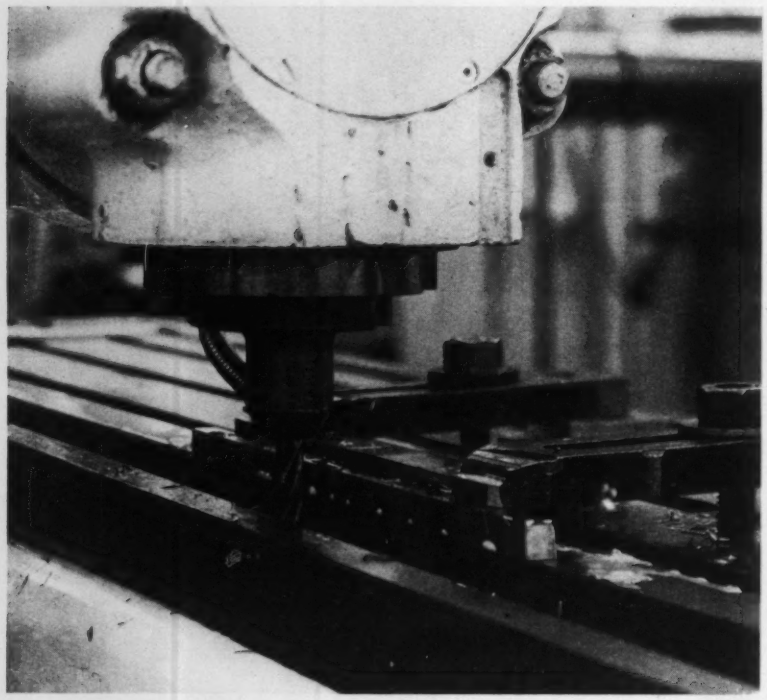
Three cutters of each brand were tested. (Performance of different brands varied widely.) All were conventional, ½ in. diameter, four flute, straight shank endmills. Before testing, each cutter was ground with a peripheral relief angle of 12 degrees and a primary relief land of 0.03 in.

A No. 3 Cincinnati milling machine equipped with a vertical head was used in the tests. Climb milling, slabbing cuts, 0.050 in. deep, were made with each cutter on the ½ by 12 in. surface of the workpiece.

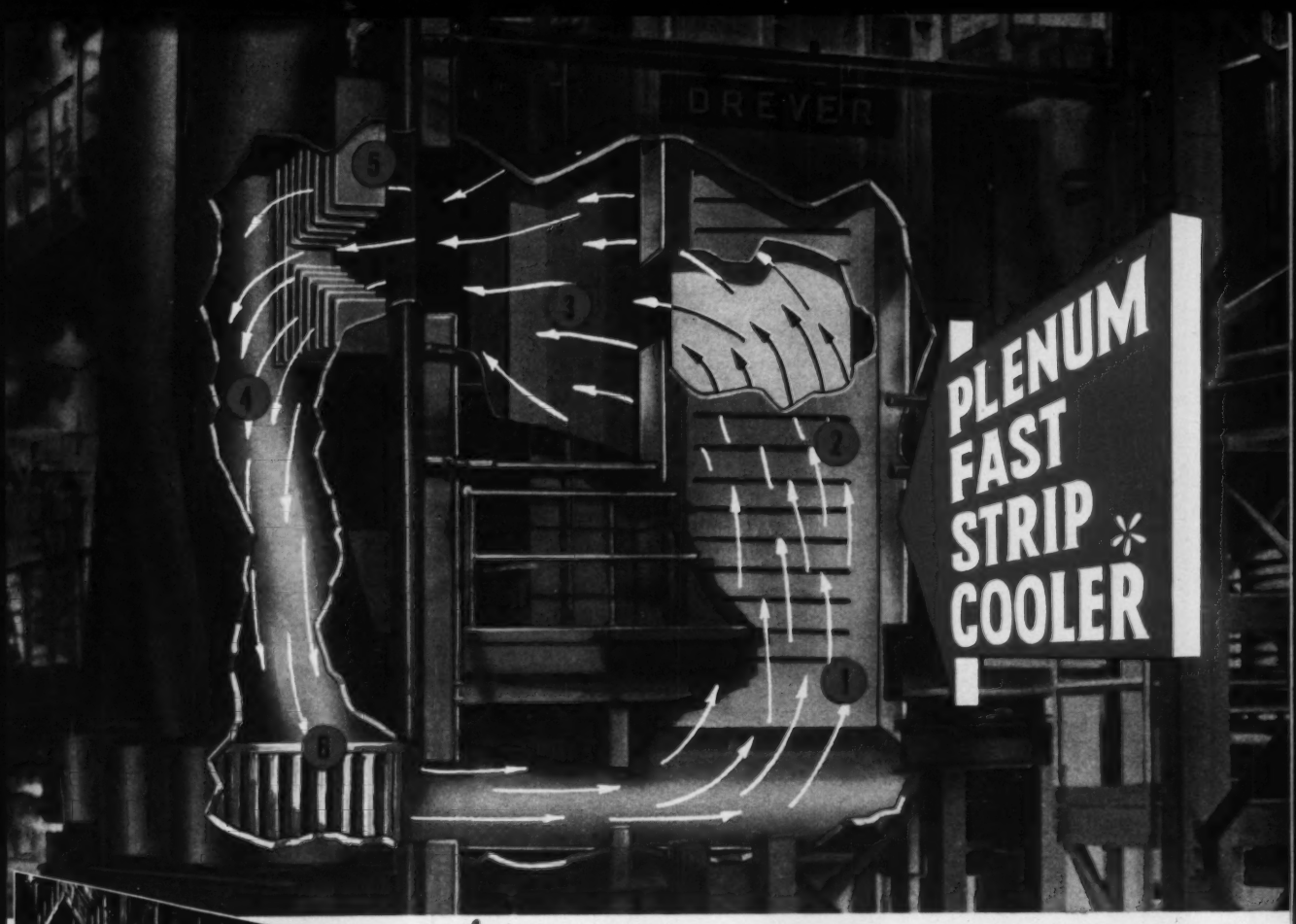
All cutters were first tested at the 19 sfpm, with all variables held constant. After each 12 in. cut, the wearland on each flute of the cutter was measured. Cutting continued until the average wearland on the cutter reached 0.010 in. The length of cut in inches of work travel was considered the tool life of the cutter. The average length of cut for the three sample cutters of each brand was recorded as the tool life for that brand.

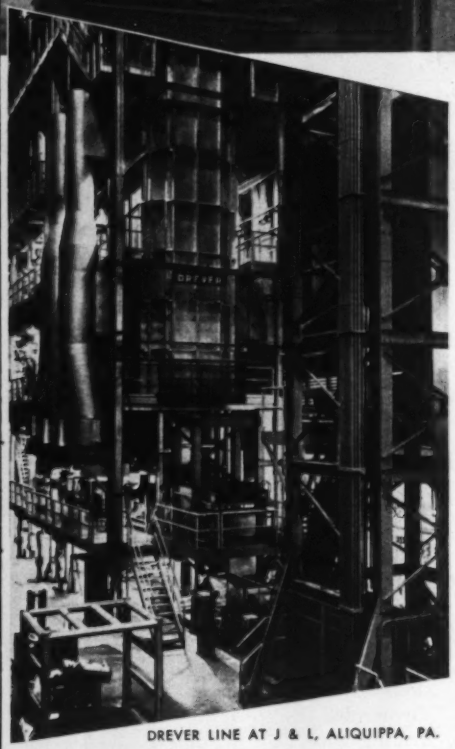
Grades tested include: M-1, M-2, M-30, M-33, T-5, T-15A, and 8 per cent cobalt, says Mr. Maxson.

Comment: One of the country's leading metal cutting authorities told STEEL he agrees with the conclusions drawn by Boeing engineers and especially concurs with the recommendation to try cutting tool materials and analyze results before you put them into full production. The expert also feels that when tool life goes beyond the 0.010 in. wearland (it's often 0.030 in. or more in production), the cobalt grades probably widen their margin of superiority over conventional tools because of their superior resistance to chipping. Thus, standard cutters may fail under extended cutting, while cobalt grades would survive.



An endmill takes test cuts on a piece of Udimet 500. Engineers studied a variety of cutters in this setup, then drew conclusions about tool materials





DREVER LINE AT J & L, ALIQUIPPA, PA.

NOT "INDIAN TALK"—JUST A CRYPTIC DESCRIPTION OF THE DREVER "CONVECOOL" SYSTEM FOR ANNEALING LINES

In an uncomplicated design of Plenums (1), Slotted Blast Vents (2), Side Suction Chambers and Ducts (3), (4); with a minimum of Heat Exchangers (5), and Blowers (6); the "Convecool" Convection Cooling System used in Drever Strip Annealing Lines embodies extraordinary engineering ingenuity.

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"Convecool" provides greater cooling atmosphere contact with the strip in a balanced design that can only fail safe without product spoilage or equipment damage. In contrast with complex water systems or multiple motor-blower-heat exchanger arrangements, the "Convecool" unit utilizes a modicum of moving parts in a simplified design that allows immediate, complete accessibility for maintenance or quick repair. Now in operation at the Aliquippa Works of Jones & Laughlin Steel Corp., the "Convecool" section of the Drever Annealing Line can handle strip up to 2000 fpm. At 1000 fpm strip is cooled from 900°F to 150°F in 43 seconds.

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Achieving a desired effect with such simplicity of design and operation takes advanced engineering. Just such engineering is necessary to meet today's demand for higher production with more exacting quality standards at lower operating cost. Our engineers are available for consultation concerning your requirements. Write or phone us. Drever Company, Bethayres, Pa. Phone: WIlson 7-3400.

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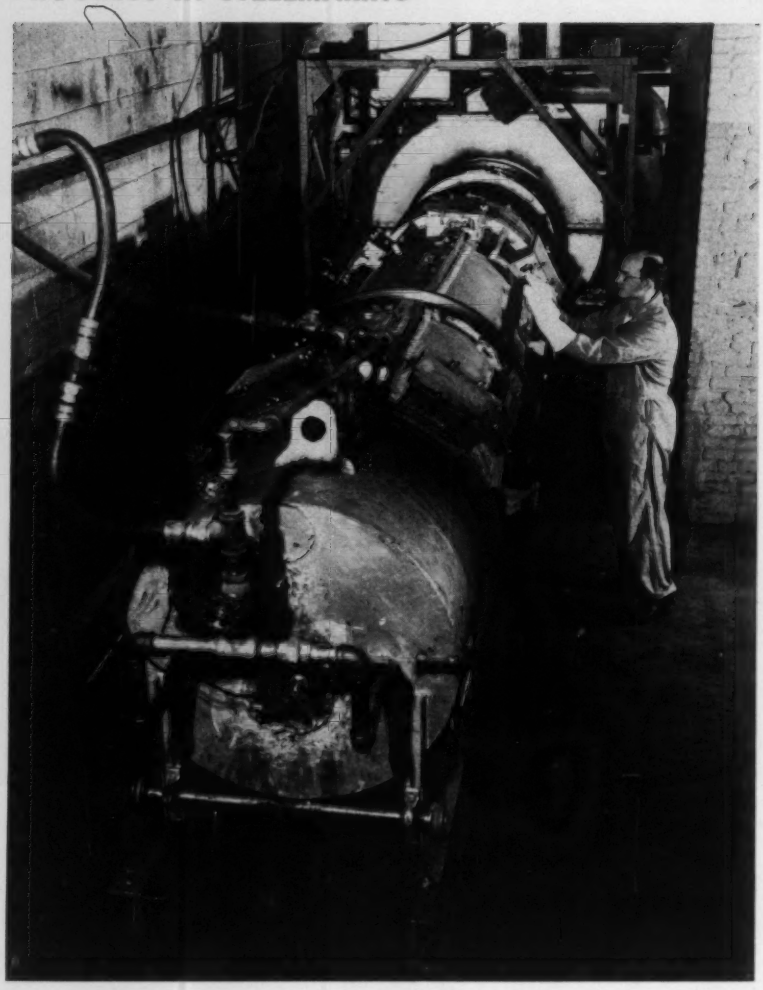
ENGINEERING AND MANUFACTURING FACILITIES AROUND THE WORLD THROUGH ASSOCIATES IN FRANCE, GREAT BRITAIN, GERMANY, ITALY AND JAPAN



Reduction kiln used in Acar process also serves as a gas cracker or reformer; unused reducing gas and unreacted fuel are burned to provide reaction heat

Iron Ore Reduction Studied With Grate-Kiln System

RESEARCH STUDIES in the production of high purity, metallic iron pellets point the way to a breakthrough in the production of material suitable as feed for the hot blast cupola, electric arc furnace, or other melting facility. An important step in the continuing study is being taken in the research division at Allis-Chalmers Mfg. Co., Milwaukee.

In a process dubbed Acar by the research division, agglomeration-reduction experiments are done in a laboratory reduction kiln that also serves as a gas cracker, or reformer, making external gas generation equipment unnecessary. Unused reducing gas and unreacted fuel are burned to provide reaction heat. Continued investigations with the equipment are expected to produce data that would justify an advanced laboratory pilot kiln for further study.

• Successful use of Grate-Kiln equipment for ore beneficiation led to variations for experimental use in direct reduction.

Two agglomeration processes have been developed by the company for making hard pellets of fine, high grade, iron oxide concentrates. (They're suitable for blast furnace feed.) A downdraft, traveling grate process is used by Reserve Mining Co., Silver Bay, Minn., to make pellets from Mesabi taconite ores. The Grate-Kiln method is used to pelletize Michigan jasper ore for Humboldt Mining Co., Ishpeming, Mich.

With revival of interest in direct reduction during the last five years, Allis-Chalmers engineers investigated the use of modifications of the Grate-Kiln system to produce metallic iron. Raw material: Concentrated magnetite pellets containing about 10 per cent more carbon than the theoretical reduction requirements.

Experiments indicated that a reducing atmosphere must be maintained on the grate and in the kiln to prevent ignition of carbon in the pellets. But maintaining a reducing atmosphere on the grate would have been difficult because of air leakage between the kiln and grate. And combustibles in the exhaust gases would be lost in the stack; stack temperatures would be unreasonably high.

Batch experiments with the reduction process were encouraging, producing pellets that were 91 per cent reduced. And low silica, oxide pellets promised an excellent pellet for foundry melting. Modification of the grate-kiln system, with a reduction kiln designed by T. G. Kirkland, supervisor of applied research, provided a vehicle for continuous processing.

• The kiln consists of a sealed, stainless steel reducing chamber, surrounded by a refractory lined heating zone.

The outer cylinder of the concentric kiln, with an outside diameter of 34 in., is lined with 4 in. of insulating brick.

The inner cylinder, with a ½ in., stainless steel wall, has an inside

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Packaging of tin plate coils is now on a production line basis in speed and low cost. Fast, dependable Signode air power tools take ¾″ and 1¼″ steel strapping from the dispenser, eliminating the waste of cut-to-length strap. Overhead tool suspension systems and engineered dispensers add mobility and save more time and effort. Engineered installations by Signode save time and money. Write for more information. Ask for free copy of "Air Power Tensioners and Sealers."

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diameter of 15 in.

Flanges at the feed and discharge ends support the inner shell and provide a seal between the two cylinders. (Additional supports are provided along the length of the inner shell.)

Stationary feed and discharge hoods are flanged and rub against rotating kiln flanges to form an airtight seal. The feed hood contains a sealed pipe for introduction of oxide concentrates and pipes for feeding in fuel, air, oxygen, or steam. The discharge hood contains a secondary burner, air pipes, and a discharge pipe for reduced material.

Manifolds and air metering boxes at the center and discharge end of the kiln feed air into the annulus between inner and outer shells to cool the inner shell supports.

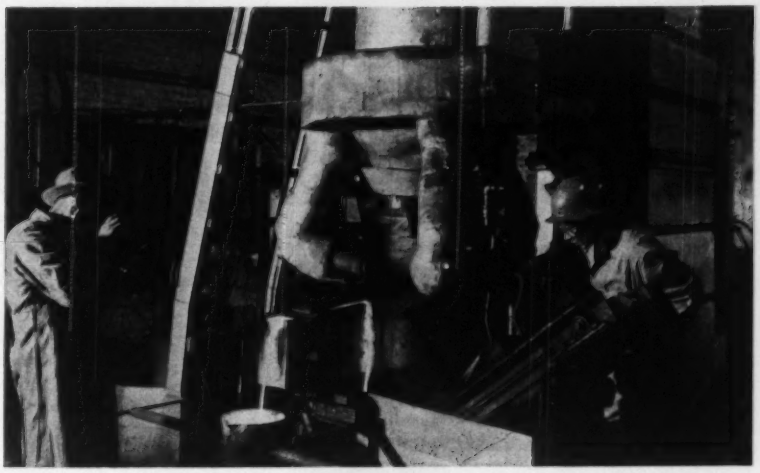
Holes through the outer shell, near the feed end of the kiln, permit the escape of exhaust gases through a hood and into a pellet drying grate. A fan in the stack draws operating air into the kiln and pulls burned gases through the grate.

• Unreduced pellets enter the kiln through a sealed feed pipe. After reduction, material leaves through a water-sealed chute.

Pellets are fed from a hopper onto a drying grate, where they are partially hardened by hot kiln exhaust gases. Then they enter the inner kiln. Oxygen, air, or steam (or a combination of the three) is piped into the feed hood with propane. (Other gaseous or liquid fuels can also be used.)

Gases flow through the inner kiln, where a temperature of 1920° F causes them to reform into an atmosphere of hydrogen and carbon monoxide. Pellets are reduced in the hot zone, which extends 13 ft from the discharge end of the kiln. Reduced material falls through a water seal in the discharge pipe and into a quench tank. It is removed by a partially submerged conveyor.

Unused reducing gases flow from the inner kiln through the annulus into which secondary combustion air is introduced. Air flow is regulated to control the temperature, length, and location of the hot zone. Completely burned gases are exhausted through the pellet drying grate and the stack. Supplementary heat can be supplied by a secondary burner in the discharge hood.



Iron pellets produced in the laboratory have been melted successfully in this water cooled, hot blast cupola at a rate of 1500 to 2000 lb per hour

• Compact equipment is suitable for foundry use.

Generation of gases in the kiln saves the cost of external reforming equipment. Reduction and heating zones are separated, allowing generation and maintenance of a strong reducing atmosphere in the inner kiln. Aspiration of air at several points along the outer shell makes for close kiln temperature control. Complete combustion in the burning zone makes for efficient use of fuel. And the pellets don't require a separate heat hardening step.

The reduction zone extends almost the full length of the kiln. That makes for minimum over-all length and permits the equipment to be used in foundries, where space might be scarce. Reduction of materials at concentration plants, then shipment to foundry sites for subsequent melting would cut shipping costs.

The process can be operated on any liquid or gaseous fuel—it doesn't require metallurgical coke. And the kiln requires little auxiliary equipment.

Mixture of carbon with concentrates before they are pelletized permits control of carbon content in the product. With extremely high grade materials, alloying metals can be added before pelletizing.

• The pellets have been melted satisfactorily in an experimental, hot blast cupola.

The cupola shell is made in three sections for convenience in construction and relining. The two upper sections are lined with 4½ in. of firebrick, giving the cupola an internal diameter of 18 in. The melting zone, or bottom section, is externally cooled with a water spray. It is lined with a 1 in. layer of hand rammed, magnesia refractory, with an internal diameter of 15 in.

The cupola well, mounted on a movable base, can be raised or lowered hydraulically. A pliable roll between flanges provides an airtight seal between the well and the melting zone.

A skip hoist is used to charge materials into the top of the cupola. A dam and skimmer separate iron and slag in the runner box. Iron is taken off at the end of the box; slag is run through a notch in the side, water quenched, granulated, and carried away by a conveyor.

Preheated air is forced into the cupola through three tuyeres, by a centrifugal blower, at a maximum pressure of 20 ounces.

Pellets are melted at a rate of 1500 to 2000 lb per hour, with a total metal recovery of 90 to 94 per cent.

At Amana Refrigeration, Inc.

STANOIL

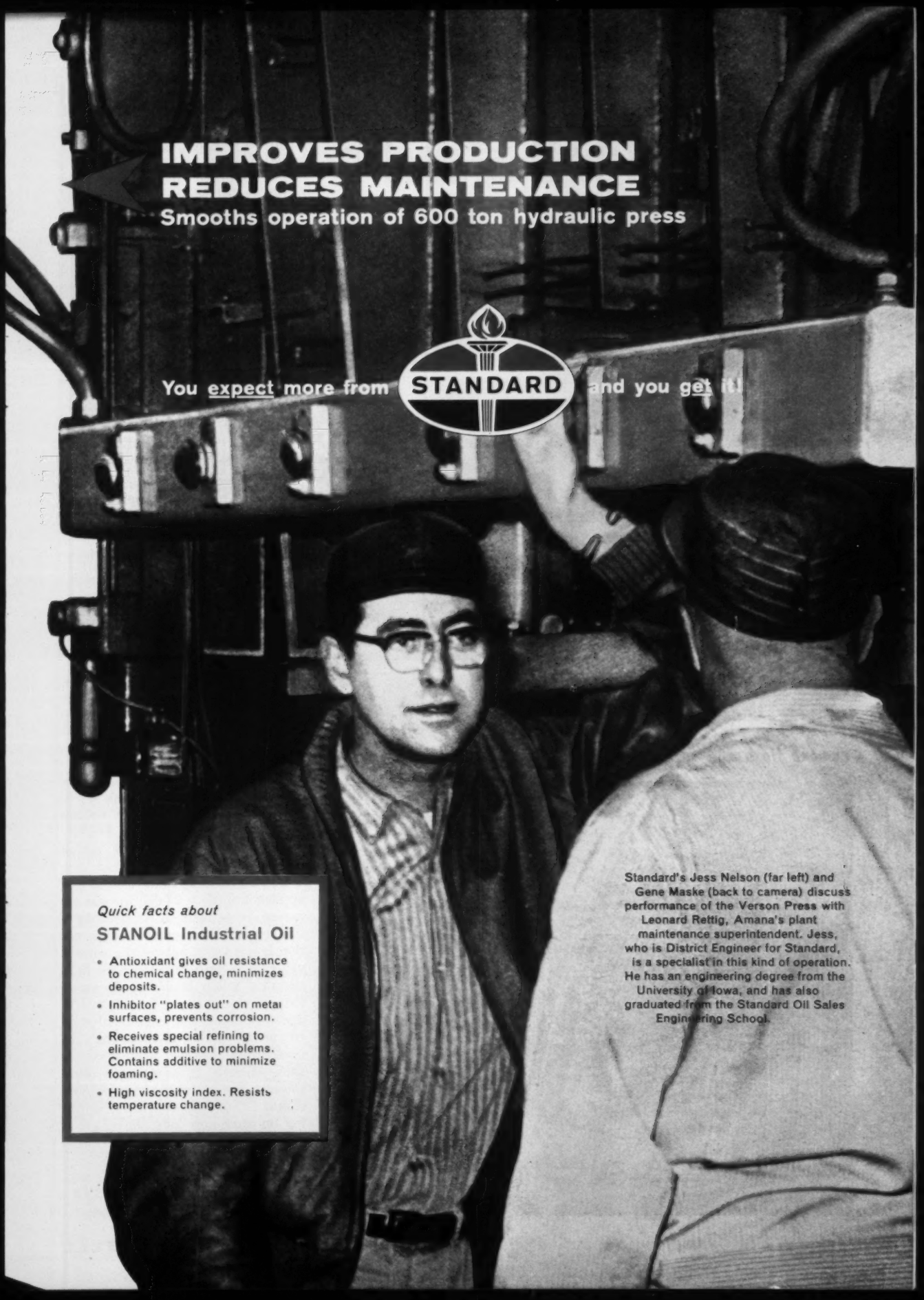
Situation: The 600 ton Verson Press at Amana is a vital operating component in the manufacture of home freezers and refrigerators. Its proper performance is necessary to the efficiency of Amana's entire manufacturing operation. That's why erratic press operation, caused by foaming of the hydraulic oil, was a serious problem.

What was done? In seeking the solution to this problem, Amana consulted their Standard Oil lubrication specialist who recommended STANOIL for this service. STANOIL Industrial Oil is a top quality, first-line industrial lubricating and hydraulic oil. It will provide excellent service in many different applications. And when tested by Amana, STANOIL proved perfect for use.

What has happened? Since STANOIL was first put to work at Amana, it has performed for extended periods of time without foaming or oxidation, lengthening the time between drainings and improving press operation. As a result of this record, STANOIL has been adopted for use on other production equipment, together with Standard's RYKON Greases and SUPERLA Soluble Oil.

What you can do: To get help in solving your lubrication problems and to learn more about STANOIL Industrial Oils, simply call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue. Chicago 80. Illinois.**

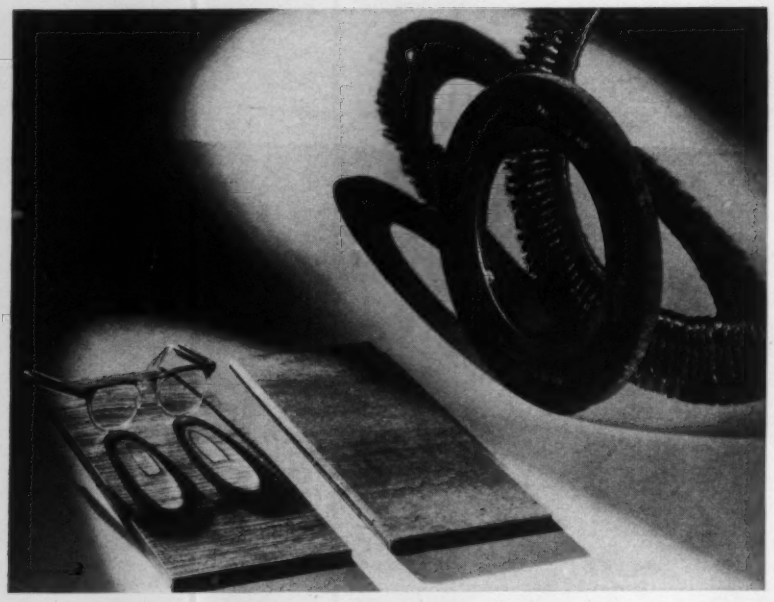
Production manager Neal Stewart reviews Amana's maintenance expense reductions with Standard's Jess Nelson.


IMPROVES PRODUCTION
REDUCES MAINTENANCE
Smooths operation of 600 ton hydraulic press
You expect more from STANDARD and you get it!
Quick facts about
STANOIL Industrial Oil
• Antioxidant gives oil resistance to chemical change, minimizes deposits.
• Inhibitor "plates out" on metal surfaces, prevents corrosion.
• Receives special refining to eliminate emulsion problems. Contains additive to minimize foaming.
• High viscosity index. Resists temperature change.
Standard's Jess Nelson (far left) and Gene Maske (back to camera) discuss performance of the Verson Press with Leonard Rettig, Amana's plant maintenance superintendent. Jess, who is District Engineer for Standard, is a specialist in this kind of operation. He has an engineering degree from the University of Iowa, and has also graduated from the Standard Oil Sales Engineering School.

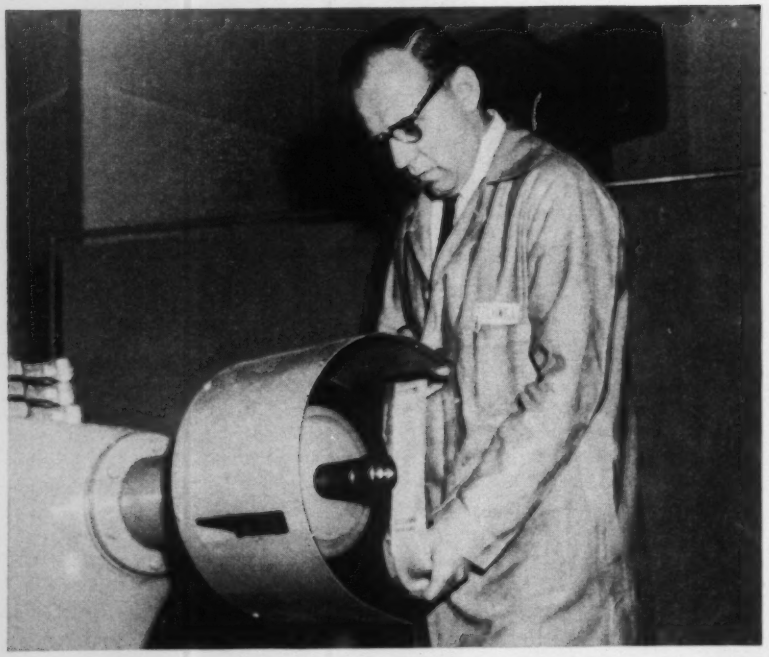
Thanks to resin bonding . . .

Wire Wheel Is Upgraded To Metal Removal Role

It'll take 0.0005 in. off SAE 1010 in one pass . . .



Remove flash and sprue from diecastings



A MOVE to get wire brushing into the field of metal removal is spearheading the product and market growth of Osborn Mfg. Co., Cleveland.

The company has a new type brush, called Master Blend, which can cut as much as 0.0005 in. of mild steel in one pass. It is hoped that it will lead to the design of equipment for a wider variety of surface preparation and finishing.

"It is not intended as a substitute for a grinding wheel, but it will fill a long felt need for something between that and a conventional wire brush," states A. J. Chandler, sales vice president.

Here are some of the applications that have been checked out.

- Removal of burrs, blending of the edges of powdered metal parts and clutch discs.
- Removal of flash and sprue bosses on zinc and aluminum diecastings.
- Removal of flash on plastics.
- Removal of soft coverings (rubber, for example) on steel reinforced hose.

• Each wire is bonded in a plastic matrix.

Conventional brushing is considered more of a cleaning than a machining tool, say Osborn engineers. Primary applications have been deburring, descaling, removal of surface films, and the superimposition of special finishes.

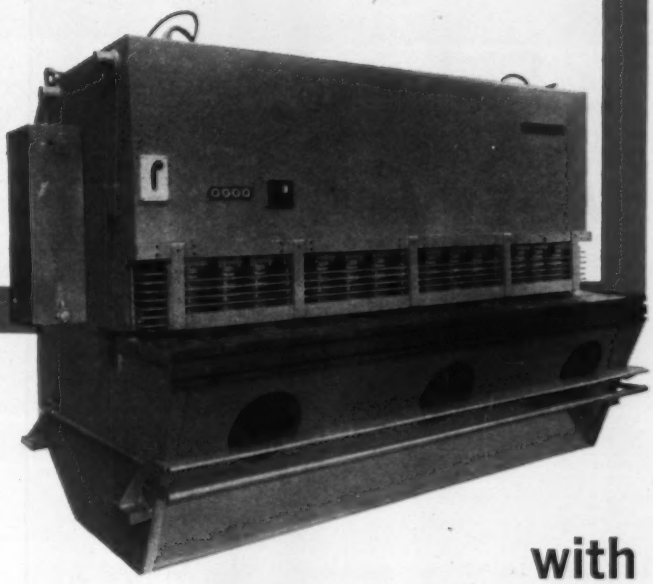
The new wheel enables operators to remove a substantial amount of metal without peening or rolling metal edges. Example: Production finishing pump gears which require a 0.005 in. edge blend.

Osborn officials claim that in one application about 0.0005 in. was removed from SAE 1010 steel in a single cut. Such metal cutting action is the secret behind the wheel's value as a flash removal tool. Self-cleaning action is said to be excellent—even when lead is involved. Speed is about the same as that of competing cutting methods, but the nonloading feature will probably show enough advantages to offset the cost of a switch, Osborn officials claim. "Not only will it put brushing on some new jobs; we believe it will supplant some of our own products," says Mr. Chandler.

Osborn's current sales: $10 million a year in brushes and $500,000 in metal finishing machinery.

Bevel and Square Edge Shearing

1 operation



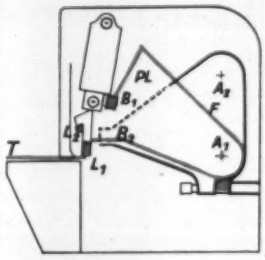
with

MPM Corpet-Louvet hydraulic shear

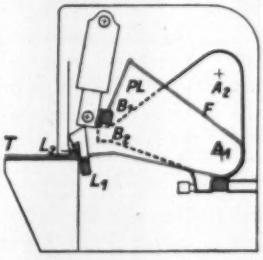
Two Blades are mounted on the blade holder PL. L^1 is for straight cut, L^2 for bevel cut.

During the straight shearing operation PL rotates around the ball and socket joint A^1 of end-bearing plate F.

L^1 shears straight into Sheet T.



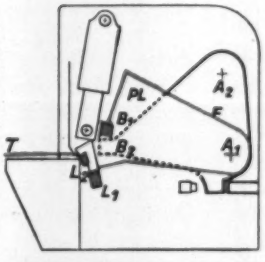
At the end of the straight shearing, thrust B^1 mounted on the blade holder PL meets thrust B^2 mounted on end-bearing plate F.



Blade holder PL and end-bearing plate F have become solid, rotate around joint A^2 of the frame.

L^2 then bevel shears.

Both square cut and bevel cut are completed in one stroke.



A MACHINE TOOL THAT DOUBLES ITS USEFULNESS IS WORTHY OF YOUR INVESTIGATION

1 time saving

a. Square cut or square and bevel cut in one stroke.

b. Perfect, clean bevels—ready for subsequent welding operations.

2 rapid—easy adjustment

a. (2) thrust screws with vernier dials and rapid lock, set and maintain square cut blade clearances.

b. (2) additional screws and vernier scales adjust clearance between bevel cut and stationary blade to permit full or partial bevel.

c. Motorized back gage with direct reading dials.

d. Optional light beam projectors permit accurate angle shearing to layout line.

3 simplified maintenance

a. All hydraulic—eliminating maintenance on gears, clutches and belts.

b. Preset—relief valve prevents damage from overloading.

c. Swivel-ram action eliminates slides—self-clearing action prolongs blade life.

d. Preset, multi-piston, variable-volume, variable-pressure hydraulic pump automatically adjusts to pressure required for plate thickness being cut.

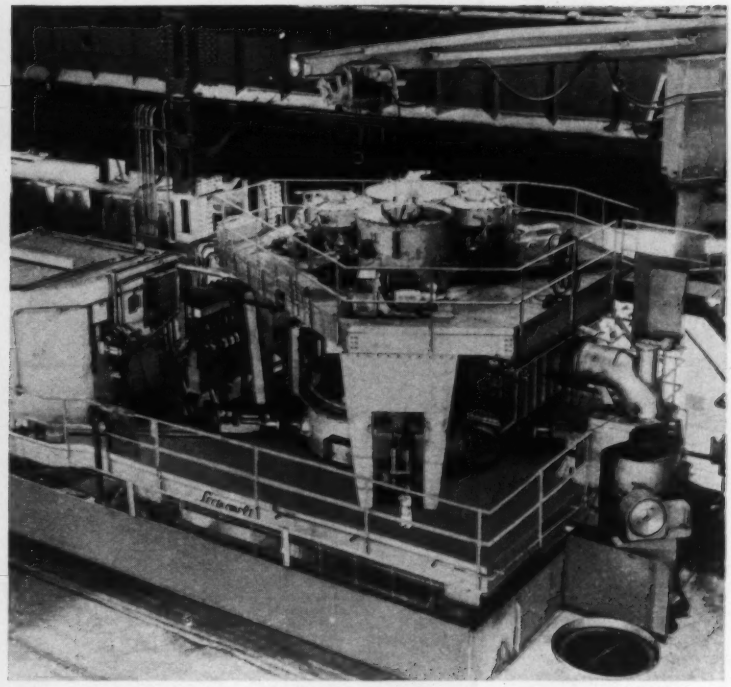
Built by METAL PROCESSING MACHINE CO.

Division of McKay Machine Co.

185 INDUSTRIAL ROAD • YOUNGSTOWN 9, OHIO

Cyclic, Vacuum Degassing Unit Is Evaluated At Crucible

Higher quality is weighed against cost premiums



Ladle car arrives at the degasser . . .

SEVERAL HEATS of steel have been processed by a cyclic, vacuum degassing unit at the Midland (Pa.) Works of Crucible Steel Co. of America. (See STEEL, Jan. 11, pp. 78, 81.) Generally encouraging results are reported by Walter E. Gregg, vice president-technology.

"Size of the unit, the extremely high vacuum under which it operates, and the fact that we are experimenting with highly alloyed steels make the program a journey into the unknown," says Mr. Gregg. "On the basis of experience to date, we feel that the Dortmund Horder process will make significant contributions to steel technology."

The degassing unit was built by Lectromelt Furnace Div., McGraw-Edison Co., Pittsburgh, a licensee of Dortmund Horder Huttenunion A. G., of Dortmund, West Germany. A smaller unit similar to Crucible's is treating carbon steels in a West German plant. The unit at Midland will be used more for evaluating contributions of the degassing process to high alloy steel production.

• Long interest in vacuum metallurgy made it natural for the company to investigate degassing processes developed in Europe.

The company has been one of the leaders in applying vacuum technology to metals, especially in commercial operation of vacuum induction furnaces. And concentration on titanium gave technical personnel experience in vacuum arc remelting.

It was a logical move to investigate various degassing units that were being used in Europe—units that provide a quality level above that obtainable in open hearth or electric furnaces.

Exact quality of the steel produced would depend on the effectiveness of the degassing unit, the steel analysis, and the particular quality advantage desired.

• Technical personnel were sent to Europe to study three types of degassing processes, including the cyclic method.

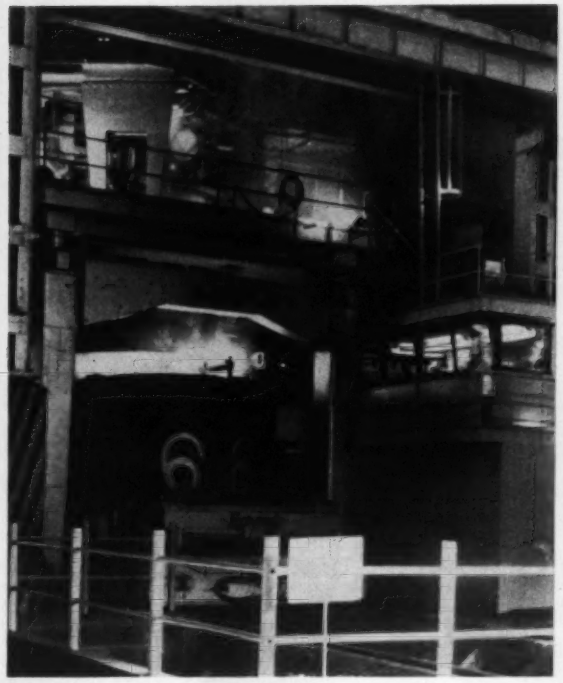
One of the processes investigated by the company, the Heraeus-Ruhrstahl Siphon, features a vacuum vessel with two legs that extend downward below the slag line in a ladle of molten metal. Argon is pumped into one of the legs, creating a circulatory, siphoning action.

The Bochumer - Verein process, which was also studied, had been used commercially and could be performed in three ways—as a ladle degassing; ladle-to-ladle, stream degassing; or ladle-to-ingot mold, stream degassing practice.

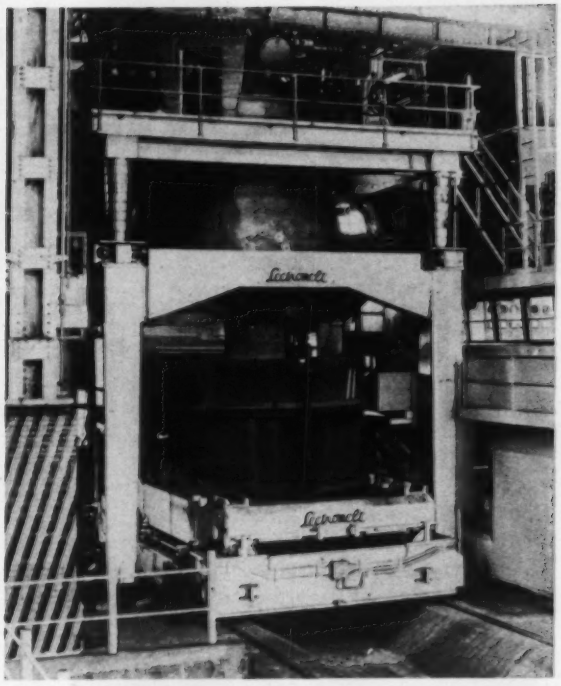
The ladle degassing setup would require expensive pumping equipment to treat large heats. The stream degassing methods have been more popular, says Crucible. In such systems, the ladle is set above the degassing unit; molten steel is poured through a vacuum chamber into another ladle or into an ingot mold in the lower section.

• The cyclic method is said to provide effective degassing because of complete mixing. If also permits addition of alloying elements.

Steel from the open hearth or electric furnace is moved in a ladle onto the trolley of the degassing system. Then it is taken under the vacuum chamber for weighing, so the right amounts of alloying additions can be made. The snorkel tube is lowered into the ladle, below the slag layer, and the pumping system is turned on; pressure in the chamber rapidly goes down approx-



the chamber is evacuated . . .



and lowered to treating position

imately 1 mm.

Atmospheric pressure causes the liquid steel to rise about 60 in. above the level of steel in the ladle. When the chamber is lowered hydraulically, steel in the snorkel spills into the degassing chamber, and droplets of molten metal—with a large surface area—are exposed to the vacuum. When the chamber is raised, steel that has been degassed flows back through the snorkel and into the ladle.

Inertia causes the degassed metal to sink to the bottom of the ladle. When the cycle is repeated, untreated steel rises into the unit. The unit is raised and lowered repeatedly. For a 170 ton, open hearth heat complete degassing is said to require about 30 minutes of treatment. During the degassing operation, carbon heating rods maintain the right temperature.

• Alloy hoppers around the rim of the chamber permit additions to be made while the steel is under vacuum. Significant chemical changes are said to occur during the process.

Additions are made after the steel is deoxidized. The process removes hydrogen from the steel. It also eliminates most of the oxygen and a large portion of the nitrogen. Carbon content is lowered (carbon, acting as a deoxidant, combines with oxygen to form carbon monoxide and carbon dioxide).

Some manganese is lost during the treatment; composition of the steel can be adjusted by compensating for carbon and manganese losses in advance, or by adding those materials through the alloy hoppers.

When the treatment is completed, the chamber is brought up to partial pressure with nitrogen (as a safety measure) before the snorkel is withdrawn to a point above the slag line, where it is open to the atmosphere.

• The company is weighing the benefits offered by the process with cost increases it makes necessary.

The Dortmund-Horder unit is extremely economical as a means of processing large heats of steel, but it is expensive, says Crucible. Its use must add to the cost of the steel, but it also offers potential savings. It is said to eliminate the long, slow, cooling cycle customarily used for large sections of certain steel grades and to increase yields by providing cleaner metal. It is also said to permit use of less alloying elements because of lower oxidation losses during vacuum additions.

• The company anticipates possible benefits to users of steel processed in the cyclic unit, but it isn't making claims until evaluation is completed.

The long soak currently used to eliminate hydrogen in the metal will be bypassed. That should reduce the length of time from melt to delivery. Oxygen removal is expected to improve steel cleanliness, making for improved transverse ductility, better fatigue resistance, higher impact resistance (lower ductile-brittle transition temperature), greater reliability, and better reproducibility. Those factors should be important in turbine rotors, bearings, diecastings, plastic mold dies, and constructional steels for aircraft and missile use.

The process is also expected to improve control of chemical composition, permitting more uniform response to heat treatment and to reduce inclusion content—providing better deep drawing, forming, and surface characteristics in flat rolled, stainless products.

MEET THE NEWEST MEMBER OF A FAMOUS STEEL FAMILY...

USS "T-1" type A steel

Since its introduction in 1953, USS "T-1" Steel has become one of the world's best known steels. Its extraordinary strength, toughness, weldability and resistance to impact abrasion have increased service life of equipment as much as ten times. No other steel has equaled "T-1" Steel's record of success.

The new USS "T-1" Type A Steel is the first addition to this family of constructional alloy steels. It is a quenched and tempered constructional alloy steel produced in thicknesses through 1" maximum with the same tremendous strength, weldability and resistance to impact abrasion as "T-1" Steel. However, through the development of a new analysis, "T-1" Type A Steel is a *more economical* steel for many applications.

USS "T-1" Type A Steel was developed through U. S. Steel's continuous research efforts to produce new and better products at the lowest possible cost. It is available in bars and semi-finished form and in plates from 3/16" through 1" thick inclusive, and in the full range of plate widths and lengths now available in USS "T-1" Steel. If extra hardness is needed, USS "T-1" Type A Steel can be furnished to a minimum Brinell hardness of 321.

For your copy of a properties card on USS "T-1" Type A Steel, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS and "T-1" are registered trademarks

SUGGESTED APPLICATIONS: Earthmoving and mining equipment, building construction, bridges, truck frames and bodies, missile transporters and launchers, oil field rigs and machinery transporters—wherever great strength, weldability, toughness, and resistance to impact abrasion are needed to build equipment stronger, lighter and more durable.

USS "T-1" Type A Steel Mechanical Properties and Chemistry

1. Produced in gages up to 1", inclusive.
2. Sold to the following chemistry: †

C	.12/.21	Cr	.40/.65
Mn	.70/1.00	Mo	.15/.25
P	.040 Max.*	V	.03/.08
S	.050 Max.*	B	.0005/.005
Si	.20/.35	Ti	.01/.03

3. Quenched and Tempered to meet the following mechanical properties:

	3/16" to ¾" incl.	Over ¾" to 1" incl.
Min. Yield Strength	100,000 psi	100,000 psi
Tensile Strength	115,000/135,000	115,000/135,000 psi
Elongation in 2"	18% min.	16% min.
Reduction of Area	40% min.	50% min.

4. Charpy impact values**
   15-foot-pounds at minus 50°F. based on longitudinal keyhole test.
5. This steel can also be produced to a min. BHN of 321, and when so produced, all other mechanical properties are waived.
6. Atmospheric corrosion resistance—at least two times that of structural carbon steel.

*When ordered to FBQ (Fire Box Quality) max. P is .035 and max. S is .040.

**Applies only to FBQ

†U. S. Patent No. 2858206

United States Steel Corporation—Pittsburgh
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United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

This mark tells you a product is made of modern, dependable Steel.

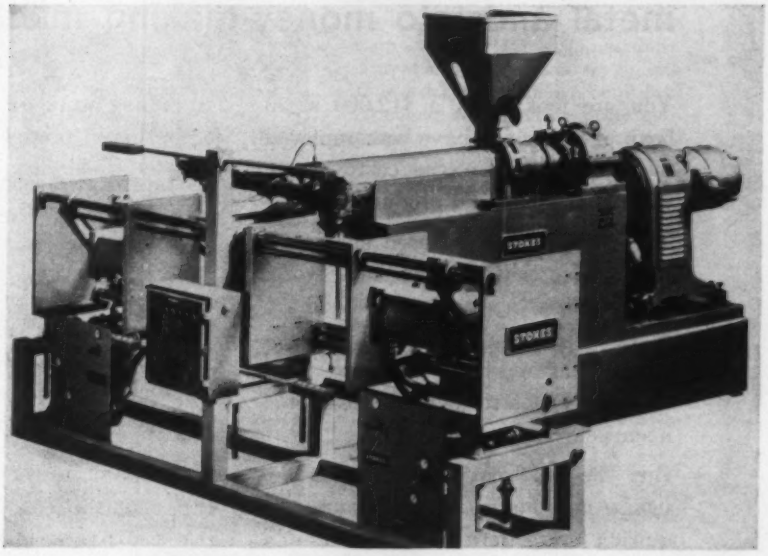
Blow Molder Handles Large Plastic Parts

MOLDED PLASTIC products such as 5 gallon pails or other large pieces using comparable weights of polyethylene, styrene, or other plastics can be made by a Stokes blow molder.

The machine (Model 856) is designed to make efficient use of the full output of a 3½ in. extruder and provides 5 tons of clamping pressure at both molding positions.

Platens (20 in. wide and 27½ in. high) at each molding position provide 550 sq in. of mold area and the 13 in. maximum stroke of the clamping cylinder provides 28 in. of daylight. Pieces up to 30 in. long can be easily handled.

For further information, *write* F. J. Stokes Corp., 5500 Tabor Rd., Philadelphia 20, Pa.

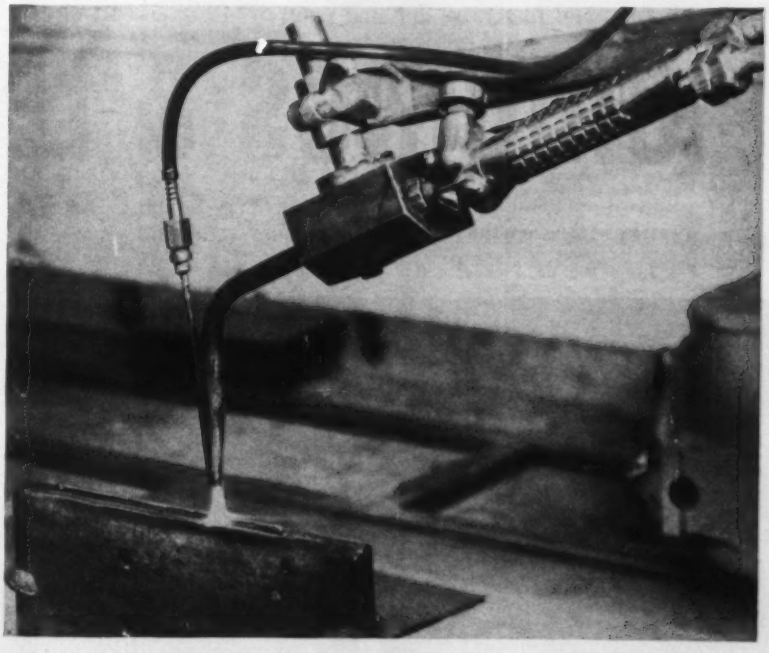


Spray Process Brazes, Hard Faces Metals

A PROCESS called Aircospray simultaneously sprays and fuses powdered metals on a base metal. It employs an oxyacetylene flame. It's recommended for hard facing operations, including deposition of powdered metals of a high melting point on a base metal of a lower melting point.

Advantage: Hard facing and brazing result in smooth surfaces. The company also says you can save on alloy; less is needed in powdered form to perform the job. Depositions can go down to 0.003 in. in thickness. That could be an added labor saving factor if grinding is needed to bring the product down to desired size.

Suggested applications include pistons, valves, saw blade guides, and other sliding surfaces on engines, pumps, and similar machinery. The process works on thin



TOOLING WITH TAPE

...the way to get dollars out of nonproductive metal and into money-making machine tools

You are looking at a $12,000 scrap heap of jigs which have been replaced by punched paper tape costing only $500 to program and produce.

The costly jigs were used simply to position cutting tools on hole work. Now, with a tape-controlled Giddings & Lewis horizontal boring, drilling, and milling machine, tools are automatically positioned with extreme accuracies.

But the tape not only replaces the jigs, *it does far more.* Inaccuracies requiring corrections on the assembly floor are a thing of the past. Certain checking operations and large gages are eliminated. Sequence of operations, feeds and speeds for drilling and boring, and feed rates and end points for milling work all are programmed for optimum production.

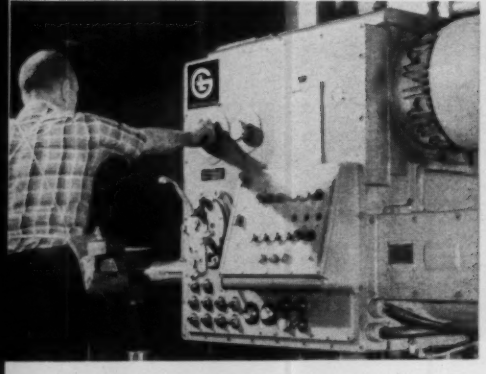
The tape-controlled machine does more work in a day — in less space — at lower cost than the machine-plus-jigs which it replaced.

The arithmetic works out well. Users of G&L tape-controlled machine tools are regaining their total investment in as little as one to four years through time and tooling savings alone.

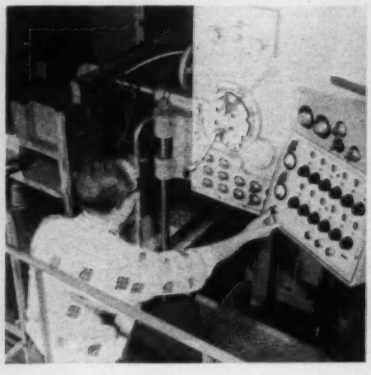
Tape control has "arrived" — to give you a cost and competitive advantage. For complete details and literature, call your Giddings & Lewis distributor or write to Giddings & Lewis Machine Tool Company, Fond du Lac, Wisconsin.

GIDDINGS & LEWIS

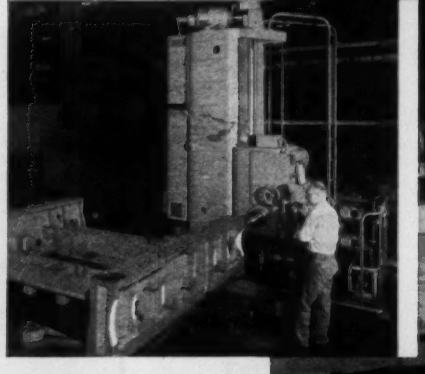
"$36,000 TOOLING SAVINGS on four parts for a new machine" — Brown & Sharpe Mfg. Co., Providence, R.I.



"ELIMINATED FIXTURES that took as long to make as the part itself" —The Budd Company, Philadelphia, Pa.



"SAVED $130,000 on tooling for one new product" — The Goss Company, Chicago, Ill.



"$12,111.48 IN JIGS TRADED FOR $513.20 WORTH OF TAPE" — The Goss Company, Chicago, Ill.

EXPERIENCE

to help you into tape

from the people who developed the first commercially available numerically controlled machine tool

There is a profitable place for numerical control nearly everywhere that short-run machining is done. But the final decision to go into tape is dependent upon a number of economic and manufacturing considerations. You can come with confidence to Giddings & Lewis to discuss these considerations.

G&L pioneered tape-controlled machine tools . . . has produced more major machines with numerical control than any other builder . . . has developed its own control systems . . . uses tape-controlled machines extensively in its own shops . . . and has established a numerical control research, development, testing, and programming center unique in the industry.

Every one of the following types of machines was *first* made available with tape control by Giddings & Lewis: contour milling machine, vertical boring mill, vertical turret lathe, die sinking machine, and horizontal boring, drilling, and milling machine.

For experienced answers to your tape control questions, consult your Giddings & Lewis distributor or the factory.

GIDDINGS & LEWIS MACHINE TOOL COMPANY, Fond du Lac, Wisconsin

Combination jig-borer and milling machine; horizontal boring, drilling, and milling machines; vertical turret lathes; vertical boring mills; positioning tables; die sinking machines; contour milling machines; radial and upright drilling machines; planers; planer mills; numerical and tracer control systems; Davis boring tools.

GIDDINGS & LEWIS

T-102

For Quality and Economy Use

MALLEABLE

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Eastern Malleable Iron Co., Naugatuck
New Haven Malleable Iron Co., New Haven 4

DELAWARE
Eastern Malleable Iron Co., Wilmington 99

ILLINOIS
Central Fdry. Div., Gen. Motors, Danville
Chicago Malleable Castings Co., Chicago 43
Moline Malleable Iron Co., St. Charles
National Mall. and Steel Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Mall. & Steel Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
Auto Specialties Mfg. Co., Saint Joseph
Cadillac Malleable Iron Co., Cadillac
Central Fdry. Div., Gen. Motors, Saginaw

MINNESOTA
Northern Malleable Iron Co., St. Paul 6

MISSISSIPPI
Mississippi Malleable Iron Co., Meridian

NEW HAMPSHIRE
Laconia Malleable Iron Co., Laconia

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Acme Steel & Mall. Iron Works, Buffalo 7
Frazer & Jones Company Division Eastern Malleable Iron Co., Solvay
Oriskany Malleable Iron Co., Inc., Oriskany
Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
Maumee Malleable Castings Co., Toledo 5
National Mall. and Steel Castings Co., Cleveland 6

PENNSYLVANIA
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Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council

NEW PRODUCTS and equipment

and light members and heavy sections.

When used with phosphorus or silver filler metals, the company says true capillary brazing (deep penetration) results. The process permits placement of the filler metal (combined with the flux) directly on the joint area. It can also be used for metal spraying (solely) and spraying subsequent to fusing.

A standard oxyacetylene welding outfit is used with a modified torch tip to spray powdered metals through the flame. The carrier gas may be argon, helium, nitrogen, or carbon dioxide. The fuel gas may be acetylene or natural gas. Torch tips are offered in three styles and a total of 15 models.

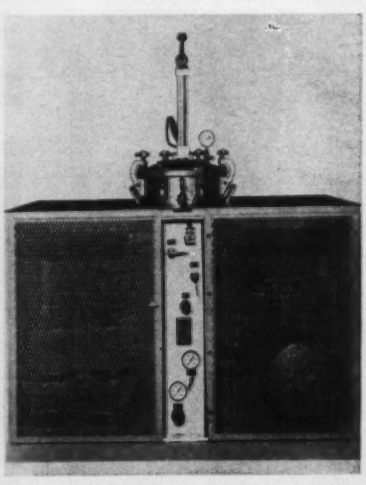
For further information, *write* Air Reduction Sales Co., a division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.

System Seals Porous Metals, Other Materials

A SELF-CONTAINED impregnating unit is used in the Sinter-Seal process for sealing powdered metal parts.

A resin has been formulated for the unit, which is also suitable for impregnating such things as carbon, electrical, and small diecast parts with oil, wax, and similar substances.

The company says that its system can render powdered metal parts (regardless of density) pressuretight and nonabsorbing. Internal contamination is prevented: All the pores of the Sinter-Sealed part are completely filled with cured thermoset plastic which remains permanently hard. There is no color change and appearance and dimensions are not affected.

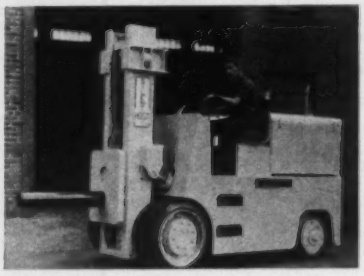


The unit accommodates up to 5400 cu in. per hour. The company says the simple, four step process is completed in 10 minutes or less. The unit measures 3 ft x 6 ft 8 in.

For further information, *write* National Sinter-Seal Co., 679 Seneca Industrial Center, Buffalo 10, N. Y.

Capacity Range of Truck Line: 10,000 to 30,000 lb

CONTINUOUS production handling is one application for the Silent Hoist Liftruk. It features a planetary axle, an automatic transmission, power steering, and a short



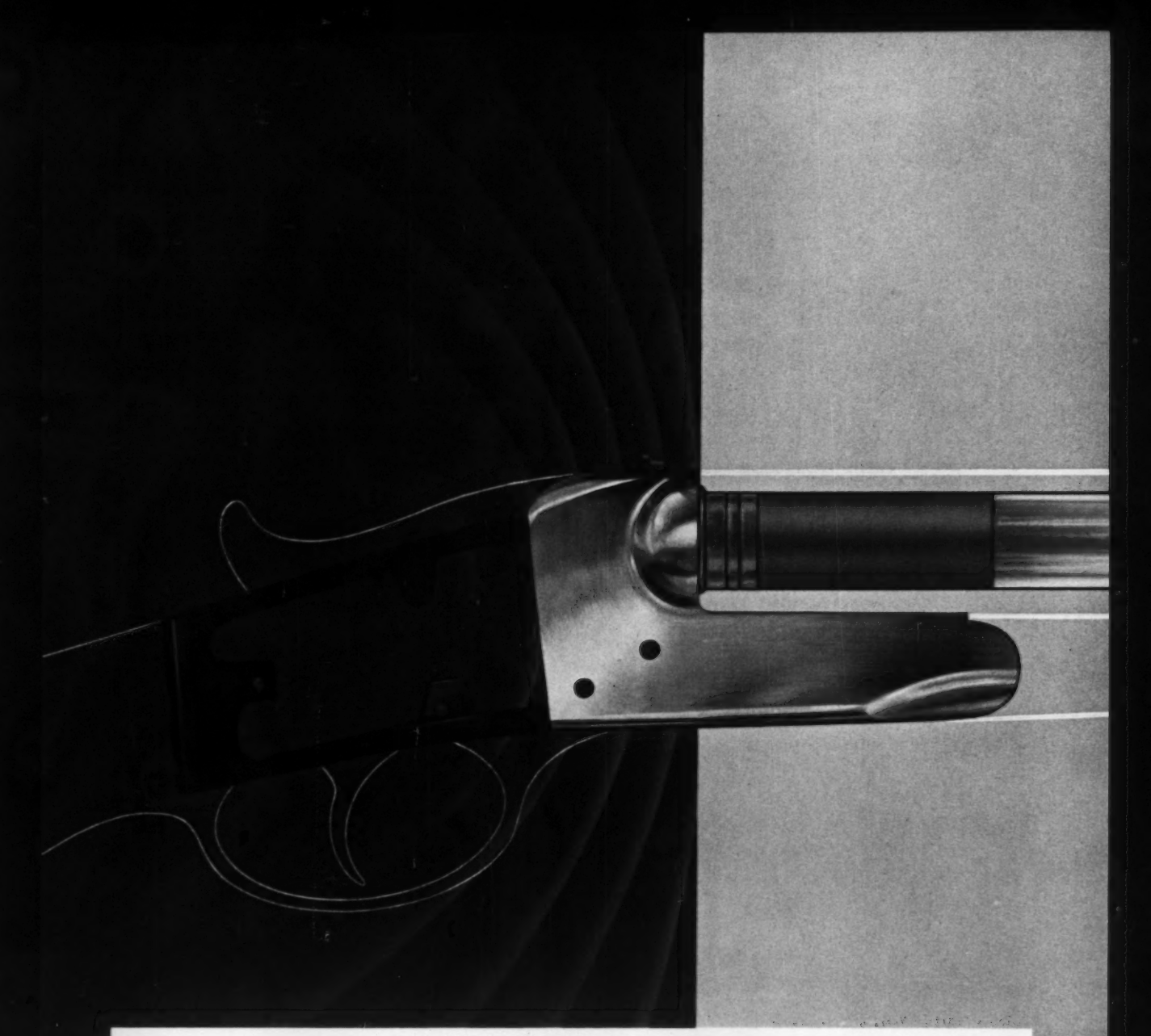
turning radius. The mill type unit is available with a gasoline, diesel, or LPG powerplant. Five sizes are available (from 10,000 to 30,000 lb capacity). Forks or a ram can be specified.

For further information, *write* Silent Hoist & Crane Co. Inc., 841-877 63rd St., Brooklyn 20, N. Y.

Quick Setup Changes Are Featured on Drill Grinder

SETUP CHANGES can be made in seconds on a Hammond multipoint drill grinder.

The unit (Model DG-1) uses the principle of conical grinding and grinds both general purpose and special purpose points common with superalloys. Point variety is obtained by simple and rapid adjustment of



Pressure on the face of this Malleable iron receiver approaches 5 tons per square inch each time this 12 gauge shotgun is fired.

For Really Tough Parts...Use Malleable

With high powered charges being fired just inches from your face, you don't want parts that can't take it. That's why so many weapon parts are made of tough Malleable iron castings.

Tremendous resistance to impact, fatigue, deflection, and wear also makes Malleable castings favorites among manufacturers of mining and construction equipment, heavy-duty tools, and other products that require extra tough components.

Have you investigated how Malleable castings will improve your product's performance and cut costs at the same time? If not, send drawings or outline of your requirements to a nearby Malleable castings producer who displays this symbol —

MEMBER

MALLEABLE CASTINGS COUNCIL

For detailed information on "Toughness", contact any of the progressive companies listed on the opposite page, or Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

TOCCO Induction Hardening

Boosts Track Pin Production 10 Times

The Eimco Corporation of Salt Lake City are producers of heavy-duty earth moving and mining equipment. They recently replaced a low production induction hardening method with a modern, more efficient track pin hardening machine engineered and built by TOCCO for high production operation.

Production Jumped from 208 pins per shift to over 2000 using only one operator. Powered by a 200 KW 3 KC TOCCO motor generator, the new machine produces parts of higher uniform quality with correspondingly better results in service.

Additional Saving is obtained because TOCCO's new continuous roll feed machine does not need center holes in the pins, eliminating two centering operations on each pin.

It will pay you to have a TOCCO sales engineer review your heat treating applications. He can help you boost production and cut costs by the engineered application of induction heating.

THE OHIO CRANKSHAFT COMPANY

Mail Coupon Today— NEW FREE Bulletin

The Ohio Crankshaft Co. • Dept. S-12, Cleveland 5, Ohio

Please send copy of "Typical Results of TOCCO Induction Hardening and Heat Treating."

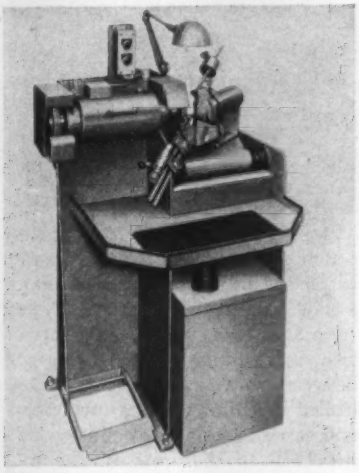
Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____



the 1/8 to 1 in. drillholder furnished as standard equipment.

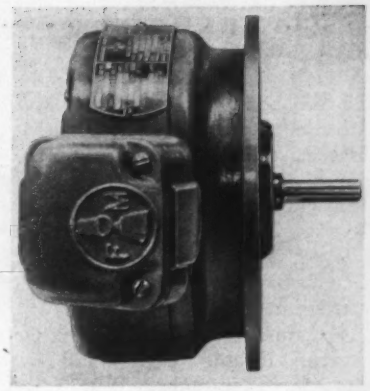
The holder can be swiveled in seconds to any point angle between 60 and 180 degrees, and set for minimum, maximum, or normal relief angles. A quickly adjustable stop limits the holder swing for three and four lip drills. The holder mounting can be quickly moved with a handwheel to make use of the wheel corner for step, subland, split point, and modified split point drills.

For further information, *write* Hammond Machinery Builders Inc., 1611 Douglas Ave., Kalamazoo, Mich.

Flange Mounted Motor Fits Into Small Space

A RADIAL, air gap motor (LO-I) in flange mounted construction expands the Fairbanks-Morse line of reduced dimension motors. The unit (developed for the original equipment market) features minimum over-all length and reduced weight with low rotor inertia. It's designed for application where space limitations are critical and where fast acceleration, frequent starts, or reversing duty is required.

The LO-I line includes ratings from 1/2 to 25 hp in speeds from 900 through 3600 rpm in three basic frame sizes. The units have several horsepower ratings in each mounting flange diameter.



In addition, a choice of four different flange diameters is available in 1, 1½, and 2 hp ratings and a 13 in. diameter flange may be supplied from 1 through 10 hp. NEMA standard D flanges and axial, air gap motor flanges are available for maximum interchangeability.

An industrial cast iron housing protects the windings and provides corrosion resistance.

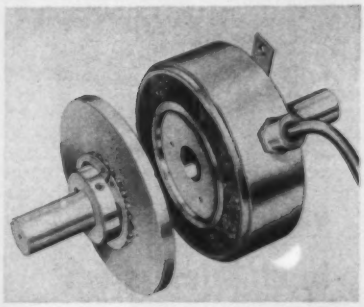
For further information, *write* Electrical Div., Fairbanks, Morse & Co., Freeport, Ill.

Clutch Also Available With Integral Brake

EASY ASSEMBLY and alignment is claimed for a stationary magnet, ball bearing mounted clutch (5.5 SMR). Coils can be wound for voltages up to 115 dc maximum and insulated with Class A through Class H insulation.

Torque is transmitted through a splined armature to the driven hub. Torque rating is 45 ft-lb. The unit can be converted to a magnetically set brake by securing the rotor to the magnet body.

The unit is also available as a clutch-brake combination designated



MANY FAST'S HAVE BEEN WORKING LONGER THAN YOU

It's a fact. There are plenty of cases where Fast's Couplings have been in service 20 to 40 years. And some of our more enthusiastic engineers say a Fast's should last forever if it's properly applied, installed and lubricated. Whatever opinion you accept, you can bet Fast's Couplings will give you the same smooth-running, low-maintenance, long-lived performance that makes them the choice of more equipment manufacturers than any other gear-type coupling.

For example, Fast's Coupling No. 1347, shipped in July, 1922, is still in service—and the customer is just ordering his first spare coupling 38 years later.

KOPPERS COMPANY, INC., 312 Scott Street, Baltimore 3, Md.

KOPPERS FAST'S COUPLINGS
Engineered Products Sold with Service

If you use stainless steel plate

this new booklet on Carlson services in stainless steel gives you worthwhile facts!

THIS new Carlson Booklet, "Producing Stainless Steels . . . Exclusively," documents a unique, specialized service. Fully illustrated, it includes detailed sections on stainless steel plates, heads, forgings, special shapes, and other stainless products manufactured by Carlson.

MAIL THIS COUPON . . .
for your personal copy of the new Carlson Booklet.

G. O. CARLSON, INC.
122 Marshallton Road
THORNDALE, PENNSYLVANIA

I would like a copy of the new Carlson Booklet.

Name_____

Company Name_____

Street Address_____

City_____ State_____

NEW PRODUCTS and equipment

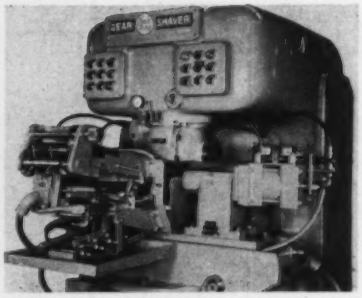
5.5 SMCB, integral with drive and driveshafts and a floor mounting bracket. Torque ratings on the clutch and brake are 45 ft-lb and both are magnetically set. It can be easily controlled by double throw relays. The 5.5 SMR clutch is available in split and through shaft arrangements.

For further information, *write* Stearns Electric Corp., 120 N. Broadway, Milwaukee, Wis.

Loader Permits Pregaging Of Unsymmetrical Parts

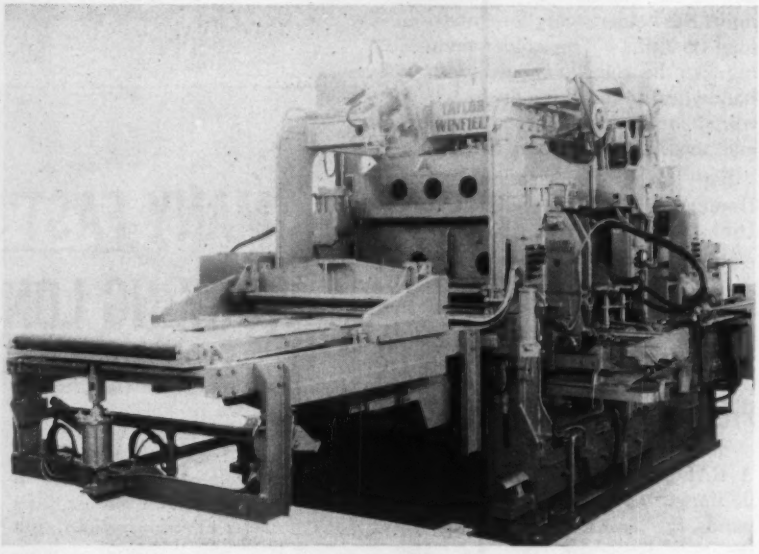
AN AUTOMATIC loader for gear tooth shaving or honing machines permits unsymmetrical parts to be easily and accurately gaged before entering the input chute.

The slide type unit is suited for



handling parts such as transmission clutch gears. The loader is operated by an air cylinder that actuates a slide. Parts are automatically fed (one at a time) at spaced intervals into machining position, clamped between centers, processed in a controlled machining cycle, unclamped, and carried into an exit chute where they roll to the front of the machine for operator or conveyor pickup.

For further information, *write* National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich.

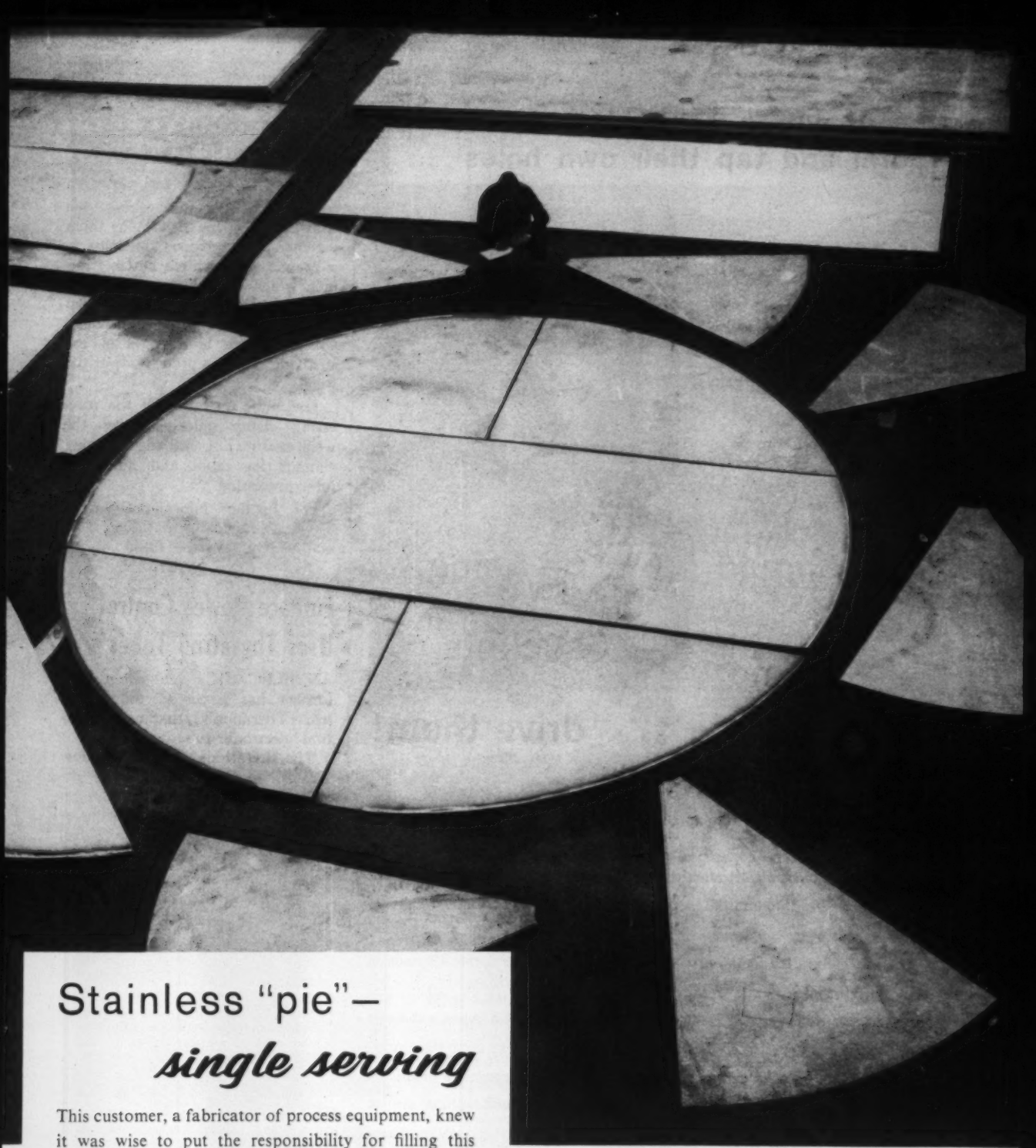


Unit Trims Welds to Strip Thickness

A SOUND weld, trimmed smooth to strip thickness is produced by Taylor-Winfield's welder. Advantage: Large coils, built up by flash welding in steel mill pickle lines, will contain less offgage material and higher tonnage can be achieved in later rolling and processing.

After flash buttwelding and trimming, the unit automatically notches or clips the edges of the strip at the weld to remove sharp protrusions which are a hazard to following operations. The protrusions occur when joining strips of different widths.

Various machine sizes handle



Stainless "pie"—
single serving

This customer, a fabricator of process equipment, knew it was wise to put the responsibility for filling this stainless steel order in the hands of a single producer—G. O. Carlson, Inc. He knew that our specialists, working with modern equipment, would make each item of the order "to specification." And he also knew that our delivery promise is a trust that we fulfill.

For your order—or orders—of stainless steel plate and plate products, come to Carlson. Here skilled men, working with the finest equipment, are determined to match your every wish.

G.O.CARLSON Inc.

Producers of Stainless Steel

122 Marshallton Road
THORNDALE, PENNSYLVANIA
District Sales Offices in Principal Cities

PLATES • PLATE PRODUCTS • HEADS • RINGS • CIRCLES • FLANGES • BARS AND SHEETS (No. 1 Finish)

if you're using screws that drill and tap their own holes . . .

Apex—the authority on fastening—has created an entirely new type of socket to drive self-drilling, self-tapping screws. Specifically designed and built of special materials to withstand shock and strain, these new Apex sockets eliminate the unusual socket wear and breakage that frequently occurs in this type of service.

The sockets are magnetic, of course, to hold the screw firmly in position from start to finish of the driving operation. And, with Apex sockets, you aren't limited to a single shank type—you can select an Apex extension with a shank built to fit the exact make of power tool you're using right now!

Write today, on your company letterhead please, for complete details on the new Apex MIA08 socket for driving self-drilling, self-tapping screws. And for complete information on all Apex sockets, ¼" to ⅝" hex or square drive, just ask for Catalog 30-A.

APEX FASTENING TOOLS

SCREWDRIVING • NUT RUNNING • SPECIAL

The APEX Machine & Tool Co. • 1032 So. Patterson Blvd. • Dayton 2, Ohio

NEW PRODUCTS and equipment

strips to a maximum width of 0.250 x 84 in. The welder positions the ends of two strips, flashwelds them together, and traverses the joint to a draw type, multiple cutter trimmer which smoothes the top and bottom surfaces. The machine then moves the joint into position where cutters engage both edges of the strip and clip any protrusions at the weld.

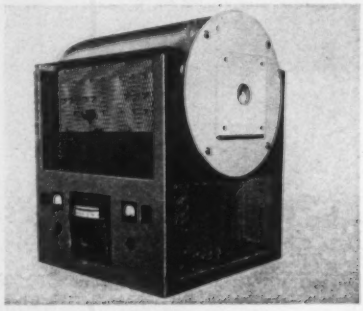
Hydraulic operation of the traversing clamp quickly moves the weld to trimming and edge clipping stations for rapid and automatic joint processing.

For further information, *write* Taylor-Winfield Corp., 1048 Mahoning Ave., Warren, Ohio.

Furnace Power Control Uses Thyratron Tubes

AN ELECTRIC, combustion tube furnace has a power control system (Thermionik) that uses thyratron electronic tubes.

The thyratrons are said to allow greater temperature control accuracy. The Thermionik system is usable with any dc producing or proportioning slide wire control system, or may be operated manually.



The furnace (Despatch Model SC-32) produces 2600° F maximum. It provides a 12 in. uniform heat zone in a 2½ in. OD ceramic tube and is rated at 7 kw on 220 volts ac.

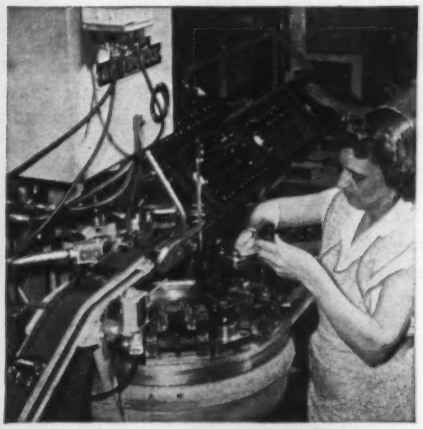
The furnace is available with automatic indicating controls and mounts for customer specified 2 to 4 in. OD tubes. It's also available as a muffle type. The entire unit is mounted on a steel enclosed base

Denison, Denison HydrOILics, and Multipress are registered trademarks of Denison Eng. Div., ABSCO

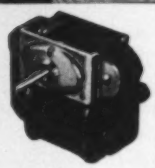
DENISON HydrOILics

DENISON Multipress installation pays off for BARBER-COLMAN with faster, simplified small motor assembly that...

CUTS COSTS



DENISON 4-TON HYDRAULIC MULTIPRESS *is used by Barber-Colman to assemble low-cost precision AC motors.*



PREDICTED cost cuts have been *confirmed* by the installation of three Denison Multipresses at Barber-Colman Company in Rockford, Illinois.

Justified by MAPI (Machinery and Allied Products Institute) formula analysis, these presses operate in a line connected by belt conveyors. Semi-automatically, Multipresses perform bending, staking, aligning, compressing, riveting and stamping operations in the production and assembly of small precision electric motors.

In addition to more efficient handling of production functions, other Multipress *bonus benefits* include—product uniformity... reduced scrap loss... rapidly adjustable stroke length and pressure for faster, simpler set-up... longer die life to lower tooling costs and downtime.

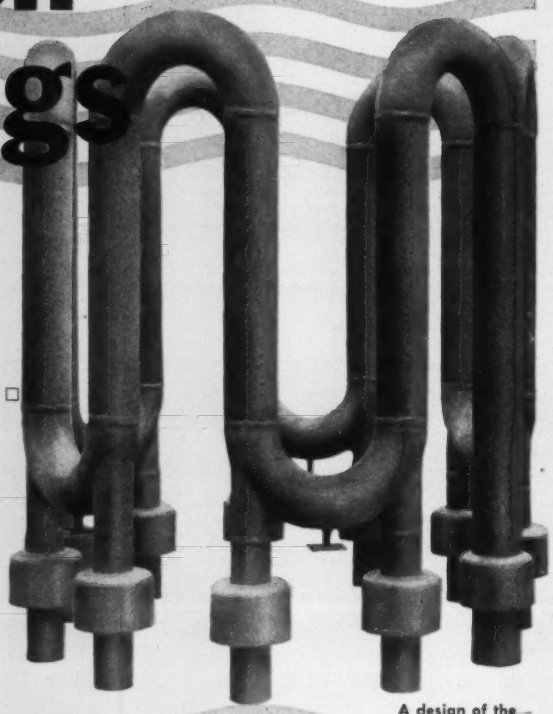
Duplicate these savings and bonus benefits in your plant today! Your Denison Production Specialist can show you how with a **M**ultipress **A**nalysis **P**rogram that can **MAP** new savings for you now.

DENISON ENGINEERING DIVISION
American Brake Shoe Company
1180 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

DENISON
HYDRAULIC MULTIPRESS

when things are HOT... call on Duraloy



A design of the A. F. Holden Co., Detroit, Mich.

Castings that Keep their Load-Carrying Strength at High Temperatures

This "immersion type radiant heater" is typical of the high reliability castings turned out by DURALOY. Centrifugally cast tubes with *UNIFORM* wall thickness...for longest service life. Static cast collars and shell molded bends...typical of DURALOY versatility.

For your high alloy casting requirements check with DURALOY... our long experience, ultra-modern foundry and up-to-the-minute test equipment will be helpful in solving your problems. For more information ask for Bulletin No. 3150 G.

The DURALOY Company

OFFICE AND PLANT: Scottdale, Pa.

EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.
CHICAGO OFFICE: 332 South Michigan Avenue
DETROIT OFFICE: 23906 Woodward Avenue, Pleasant Ridge, Mich.

NEW PRODUCTS and equipment

which houses instrumentation and auxiliary equipment.

For further information, *write* Despatch Oven Co., 619 S. E. Eighth St., Minneapolis 14, Minn.

Submersible Motor Design Permits Close Coupling

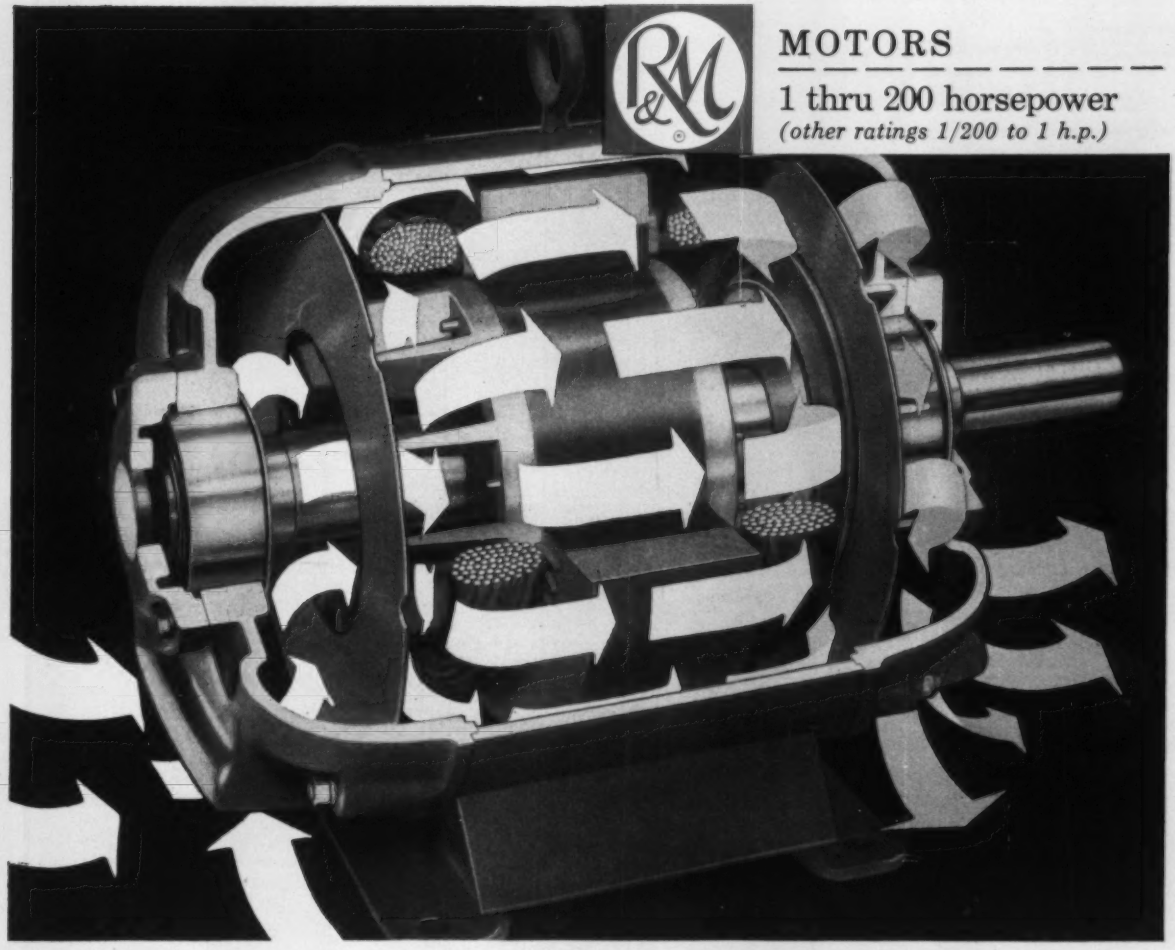
PRESSUREPROOF, submersible ac motors have been introduced by Reliance Electric. The line is available in sizes from ½ through 40 hp from polyphase power and from ¾ through 5 hp for single phase connection.

They're designed for close coupling to centrifugal pumps operating in any depth of fluids such as water, oil, or liquid chemicals.

The motors are rated at 131° F temperature rise for 30 minute duty in 104° F air, and for continuous duty in 140° F liquids. The units have Liqui-Seal construction and are oil filled to give total protection against bearing wear. They never need additional lubrication. Construction is leakproof.

A reconnectable dual voltage feature is available on single phase units from ¾ through 2 hp and on all polyphase motors. Single phase control is available.

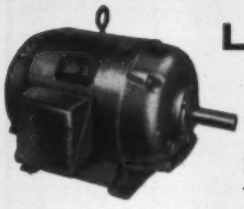
For further information, *write* AC Products Dept., Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio.



MOTORS

1 thru 200 horsepower

(other ratings 1/200 to 1 h.p.)

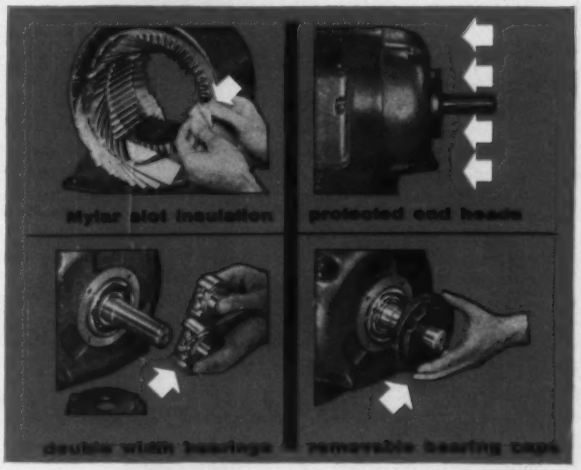


Longer Life because High Velocity *"Dual-Sweep"* ventilation *Cools and Cleans!*

ROBBINS & MYERS "Dual-Sweep" ventilation is a new concept in high velocity internal cooling and cleaning, designed to greatly prolong motor life. Tandem fans—one pushing, one pulling—create end-to-end ventilation that eliminates "dead" areas and converging air currents which deposit dirt. Venturi baffles at each end of the motor direct air in a washing action over and around end coils where it's most needed. Passages between field and outer shell form a "cylinder of air" which carries off motor heat.

R&M motors' long-life insurance also includes these features: Mylar* insulation that has 8 times the dielectric strength and 35 times more moisture resistance than ordinary paper insulation . . . double width bearings with extra-large grease capacity . . . end heads that offer full height protection . . . removable caps for quick bearing inspection and re-lubrication. For details, write today for Bulletin 520-ST.

**DuPont registered trademark*



ROBBINS & MYERS, INC.

motors, household fans, Propellair industrial fans, hoists, Moyno industrial pumps

SPRINGFIELD, OHIO · BRANTFORD, ONTARIO

NEW literature

Write directly to the company for a copy

Industrial Bucket Elevators

Engineering data on various types of bucket elevators and recommended grades of belting best suited for elevating materials of different weight, abrasiveness, temperature, and other characteristics, are discussed in a 22 page booklet (No. 174). Hewitt-Robins Inc., 666 Glenbrook Rd., Stamford, Conn.

Hose Assemblies

Construction, properties, full engineering data, and assembly instructions of Anaconda Type T4 hose and re-usable fittings are described in Bulletin TC-46. The hose has a Teflon core. Dept. R, Metal Hose Div., Anaconda American Brass Co., Box 791, Waterbury 20, Conn.

"T-1" Data

Design advantages and engineering properties of "T-1" alloy steel castings, plus welding and machining data, are covered in Bulletin No. 300. Alloy Steel & Metals Co., 1848 E. 55th St., Los Angeles 58, Calif.

Indexing Table

Catalog U-100. 12 pages, gives complete technical specifications and illustrates typical applications for the high precision, Ultradex indexing tables. AA Gage Co., 350 Fair St., Detroit 20, Mich.

Nickel Sulfamate Plating

Microphotographs and charts illustrate a 16 page bulletin detailing a nickel sulfamate process. It describes solution preparation for both still and barrel operations; effects on deposits of using various proportions of the solution's constituents, effective temperatures, current densities and voltage requirements; purification methods; analytical procedures for constituents; equipment and materials needed to operate the nickel sulfamate bath. Hanson-Van Winkle-Munning Co., Church Street, Matawan, N. J.

Mounted Point Wheels

Specifications on special shape, mounted point wheels available, wheel shapes and diameters, lengths, mandrel diameters, and list prices make up Bulletin SS-101. American Emery Wheel Works, 1 Richmond Square, Providence, R. I.

Grooved Pins Data

Dimensions, fastening applications, and various types of Groov-Pins and grooved drive studs are described in a 12 page catalog. Groov-Pin Corp., 1125 Hendricks Causeway, Ridgefield, N. J.

Materials for Cryogenics

"Steels for the Containment of Liquefied Gas Cargoes," a 27 page reprint, aids the selection of materials for cryogenic service. Data sheets for the 2¼, 3½, and 9 per cent nickel steels, and for Type 304 stainless steel, are presented. International Nickel Co. Inc., 67 Wall St., New York 5, N. Y.

Welder Data

An ac-dc welder (gasoline engine driven) and a dc welder (diesel engine driven) are described in Bulletins NH-182 and NH-183. National Cylinder Gas Div., Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill.

Coagulation Chemicals

The chemistry of coagulation applied to effective water treatment in municipal and industrial plants, practical approaches to problems, and solutions are discussed in an eight page brochure, A-1. Nalco Chemical Co., 6216 W. 66th Place, Chicago 38, Ill.

Control Relays

Color coding information is given in an eight page folder on the 30 Clark Color-Selective Conversion Kits for modifying relays in the "PM" line. Coil application data show how to select magnet coils for relays with any possible circuit arrangement. Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio.

Vacuum Furnace Data

Hot wall, vertical retort, vacuum furnaces; horizontal retort, vacuum furnaces; vacuum, bell type furnaces; cold wall, vacuum furnaces, and a vacuum, atmosphere retort tube for research and pilot plant use are described in an eight page bulletin (No. 800). Lindberg Engineering Co., 2444 W. Hubbard St., Chicago 12, Ill.

Aluminum Data

"Aluminum Casting Alloy Ingot," 12 pages, presents tabular information on composition, suggested uses, properties, and recommended thermal treatment of alloys. Aluminum Co. of America, 767 Alcoa Bldg., Pittsburgh 19, Pa.

Plastic Molding Techniques

Six basic techniques for molding reinforced plastics are discussed in a ten page booklet. Also given are physical and chemical properties of parts molded by each method. Reinforced Plastics Div., Society of the Plastics Industry Inc., 250 Park Ave., New York 17, N. Y.

NEW BOOK

Chipless Machining, Charles H. Wick, Book Dept., Industrial Press, 93 Worth St., New York 13, N. Y., 502 pages, $10

Various processes for cold working steel are described. The book covers the steps in making parts, equipment design and tooling, typical applications, and the economies of moving metal rather than removing it. Included are working data on the processes of spline and gear rolling, radial forging, power spinning, cold extrusion, and high energy rate forming.

Don't take chances on couplings

CHECK PUBLISHED MISALIGNMENT RATINGS BEFORE YOU BUY

Since misalignment is the basic problem that shaft couplings are designed to solve you'll find a published conservative misalignment rating (along with load capacity rating) for every Fast's Coupling. Compare it with the misalignment rating of any other coupling you are considering.

One further advantage of Fast's Couplings' misalignment ratings: You save money on installation because, knowing the ratings, you don't have to line up driving and driven elements with pinpoint accuracy. It's one more important reason why Fast's Couplings are the choice of more equipment manufacturers than any other gear-type coupling. KOPPERS COMPANY, INC., 312 Scott Street, Baltimore 3, Md.

KOPPERS

FAST'S COUPLINGS

Engineered Products Sold with Service

MORGAN
WORCESTER
4-STRAND
ROD MILL
American Steel & Wire Division, United States Steel Corp.
CUYAHOGA WORKS, CLEVELAND, OHIO
Rolling tonnage records
such as an average of 551 tons per eight hour turn
for 83 consecutive turns.
MORGAN CONSTRUCTION COMPANY WORCESTER, MASS.
ROLLING MILLS • MORGOIL BEARINGS • WIRE MACHINERY • REGENERATIVE FURNACE CONTROL • EJECTORS • GAS PRODUCERS

HAND IN GLOVE

. . . most aptly describes the way we work with *every* customer, *every* step of the way . . . from plant to front office.

At Seaway Steel, every order, regardless of size, gets the same special attention, personal and accommodative service.

The extreme flexibility of our rolling schedules enables us to produce any size rod or bar to your specifications . . . and under normal conditions *produce it faster.*

SPECIAL ANALYSIS • SPECIAL SURFACE FINISHES
SPECIAL HARDNESS • SPECIAL HEAT TREATING

Seaway personnel have worked together for decades producing quality bars and rods for the Fastener and Forging Trades. Our vast knowledge and experience of the requirements for Cold Heading and Nut Formations is at your disposal.

Ask us about a delivery date on your next order.

NX 3-9700

SEAWAY STEEL CORPORATION

101 EAST AVENUE • NORTH TONAWANDA, NEW YORK

Steel Demand Trending Upward

THE STEEL MARKET is brightening perceptibly. You can't prove it by the ingot rate (it's stuck at less than 50 per cent and probably headed for a 1960 low during the Christmas week), but steelmakers are pretty well convinced that they've passed the low point on order entry.

From the Chicago area come reports of better demand for flat rolled products, with the emphasis on cold rolled sheets. Automakers, appliance manufacturers, and farm machinery builders say they'll want more steel in January than they've ordered for December.

From the East come clear indications of greater consumer interest in heavy products, plates, and structurals. There's more demand from construction (despite last week's blizzard), railroad equipment builders, oil and gas industries, ordnance, and shipbuilding.

MODERATE GAINS— Because of the increased ordering, January is bound to be a better month than December. But orders look good only because they're being compared with December's abnormally low figures. At best, next month's production and shipments will snap back to November levels. Progress will be slow through February, accelerating a little in March.

DULL FIRST QUARTER— Steelmaking operations may hurdle the 60 per cent mark toward the end of March, but the average rate for the first quarter probably won't be in excess of 57 per cent. It's hard to visualize pronounced improvement until April because: 1. The winter months are always slow for containers, rails, and construction. 2. Automakers, the largest consumers, are giving the market maximum support now. They may buy more steel in January than they did for December, but their first quarter output probably won't average more than 525,000 cars a month (vs. nearly 600,000 a month in the fourth quarter).

LIQUIDATION MAY END— If steel output climbs faster than expected, it may do so for reasons unrelated to consumption: 1. Users may stop liquidating their inventories and start buying as much metal as they're using. 2. Steel producers may decide to increase their own stocks of semifinished material in preparation for greater demand in the second quarter. Barring such changes in inventory policy, most market analysts are convinced that steel will remain on a low plateau until consumption picks up seasonally.

DON'T SELL '61 SHORT— Although most forecasters are putting 1961 steel ingot production at 100 million tons or less—and hoping to avoid guessing too high for the fourth year in a row—they may be overdoing conservatism. If consumption picks up steadily (as predicted) and leadtimes lengthen significantly, there could be a massive shift toward inventory building late in the year. Reason: Fear of another steel strike in July, 1962. Under those circumstances, 1961 output of 110 million tons or even 115 million wouldn't be too surprising.

AISI CHANGES REPORTS— The steel industry will discontinue releasing its weekly operating rate related to capacity on Jan. 1, 1961. Reason given by American Iron & Steel Institute: Percentage of capacity operations is unrealistic as a measure of the industry's economic activity. In their place, weekly statistics of the tonnage of ingots and castings produced in the previous week, the tonnage of the next preceding week, and the percentage gain or loss will be given. In addition, the tonnages for the year to date in the current year, and the previous year for the same period, together with percentage gain or loss, will be issued. A new production index has been devised based on average weekly production for the 1958-59 period, as well as indexes for each of the 11 steelmaking districts.

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*Current prices were published in the Dec. 12 issue and will appear in subsequent issues.

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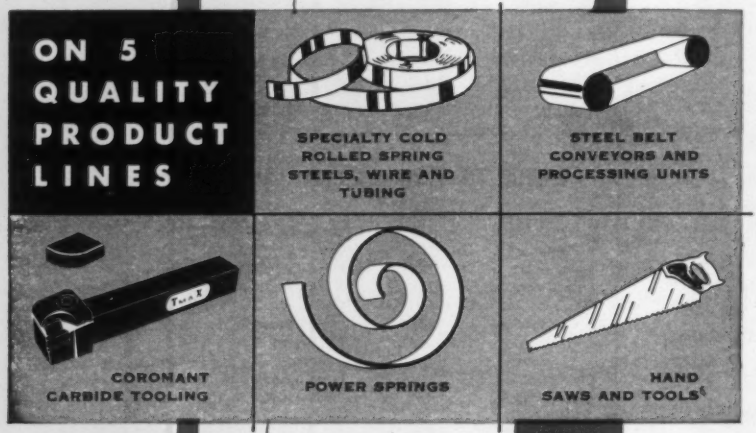
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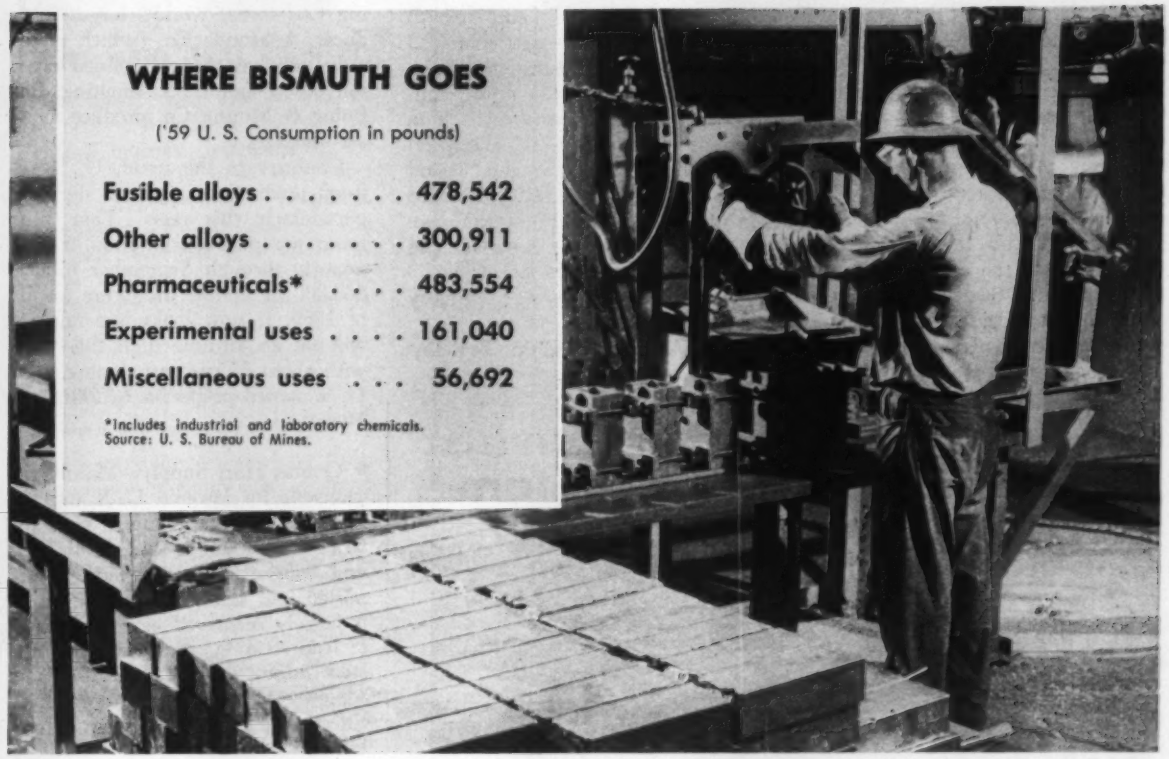

WHERE BISMUTH GOES

('59 U. S. Consumption in pounds)

Fusible alloys	478,542
Other alloys	300,911
Pharmaceuticals*	483,554
Experimental uses	161,040
Miscellaneous uses	56,692

*Includes industrial and laboratory chemicals.
Source: U. S. Bureau of Mines.

Bismuth Gets Thermoelectric Boost

THE RELATIVELY new science of thermoelectrics (STEEL, Oct. 10, p. 221) has focused more attention on an old metal—bismuth—than at any time in that metal's 200 year history.

Two new uses could boost bismuth's consumption dramatically:

• When bismuth is combined with tellurium (on a 50-50 basis), the resulting bismuth-telluride alloy is the best material known today for thermoelectric cooling. With tellurium usage expected to more than double to more than 700,000 lb yearly by the late '60s, thanks to thermoelectrics, bismuth's stake in the market seems assured.

• As a catalyst in production of plastics, bismuth might find almost as lucrative a market. Forecasts indicate that within two years usage for that purpose could grow from virtually nothing to around 500,000 lb yearly, most of it in this country. That in itself would hike present U. S. consumption by nearly one-third.

Though highly optimistic, producers aren't allowing themselves to make too bullish a forecast about the twin possibilities. They remember the bismuth-manganese permanent magnet that was highly touted several years ago but never did find a major market because of cost.

• **From Ulcer to Alloy** — What makes bismuth such an interesting material today is its unusual properties: It has the lowest thermal conductivity of any metal except mercury. It is one of the few metals that expands when it freezes. It has low neutron absorption and a low melting point.

Those properties have led to a multiplicity of uses. Historically, the biggest tonnage went to the pharmaceutical industry (a standard ulcer, overacidity remedy). That is still true in Europe, but in this country by far the largest chunk now goes into alloys for metalworking.

When combined with metals like lead, tin, indium, and cadmium, bismuth forms a series of low melting or fusible alloys that can be cast around parts to hold them for a variety of operations; it is melted away later.

Another expanding market is in malleable iron castings (mainly for auto crankshafts) where addition of 0.005 to 0.025 per cent bismuth greatly increases machinability.

The aluminum industry uses 0.5 per cent bismuth in its free-cutting, screw machine stock to increase machinability.

• **Marking Time**—U. S. consumption has been on a plateau for the last decade. Growing metalworking uses, particularly in fusible alloys, have been offset by declining pharmaceutical demand. Demand hit a low point of 1.2 million lb in 1958, moved up to 1.5 million lb last year, and should show a modest gain in 1960. Outlook for '61: Another improvement.

Actual consumption is a little

greater than official figures indicate. An estimated additional 100,000 lb or more of bismuth enter the country each year in the form of a lead bullion.

• **Supply Adequate Now**—Unlike tellurium, no early problems are seen in the supply of bismuth. U. S. production isn't up to domestic consumption, but the combined output of North and South America can more than take care of the demand needs of this hemisphere.

Together, North and South America produced more than 2.3 million lb of bismuth last year, out of the world total of 5.2 million lb (includes Communist China but not the USSR or European satellites). That was the second best year on record exceeded only in 1956 when the figures were 2.4 million lb for the Americas and 5.3 million lb for the world.

The U. S. has only three primary bismuth producers.

One, American Smelting & Refining Co., is the world's largest producer. Anaconda Co. (which mines only and has the ore refined on a toll basis) and U. S. Smelting, Refining & Mining Co. produce modest tonnages.

Contrary to the trend, U. S. refined production has been slipping, particularly this year. That, plus some stepup in consumption, is why imports through September totaled 868,000 lb, double the figure for all of 1959. It now looks like imports will set an all-time high this year, with about 75 per cent coming from U. S. owned properties in Peru and Mexico.

• **Quotas Hurt Supply**—Mainly responsible for lowered U. S. output, say producers, are quotas that restrict the amount of lead metal, ores, and concentrates that can be imported and smelted here. Bismuth is largely recovered as a byproduct of lead refining. Some Asian tungsten mines contain bismuth, and some metal is recovered from tin refining. There are no bismuth mines, as such.

Cerro de Pasco Corp., which brings in refined metal from its Peruvian properties, is the second biggest supplier to the U. S. market. American Metal Climax Inc. and Asarco import bismuth from their Mexican operations. In Canada, Molybdenite Corp. of Canada produces a semirefined (97 per cent pure) product. Deloro Smelting & Refining Co. ships a 20 per cent bismuth to the smelter for recovery.

• **Ace in the Hole**—What happens if all the potential uses catch hold and bismuth demand rockets? First of all, any short term pinch could be met from U. S. producer stocks of more than 1 million lb, mainly held by Asarco. Looking farther ahead, producers say that if the price were doubled, world output could be nearly doubled. Reason: It would be profitable to reopen the Korean tungsten mines and process the ore for its bismuth content.

• **Prices Stable**—A price jump of significant size isn't likely to happen soon (if ever). The current world price of $2.25 a lb (in ton lots) has held since 1950. The way the market shapes up now, it looks like early price increases are possibilities rather than probabilities—and would be modest.

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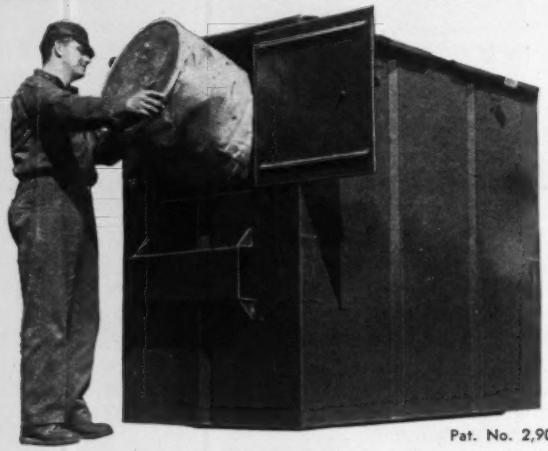

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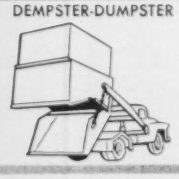

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Steel Executive Expects Order Gain Next Quarter

December looks like it will be the poorest month of the year in the steel business, but some upturn is expected early next year, says A. S. Glossbrenner, president, Youngstown Sheet & Tube Co. The steel executive said that while incoming orders indicate an upturn, full capacity operations are not in sight.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 154 & 155

With most buyers marking time, little improvement in sheet demand is in prospect for the immediate future. Household appliance manufacturers are buying hand to mouth. Manufacturers of commercial refrigeration equipment and containers are not showing much interest. Chief demand is still coming from the automotive trade, with hot rolled sheets available in ten days to two weeks and cold rolled in two to three.

Because of operational cutbacks between Christmas and New Year's, December's production and shipments probably won't be as high as July's. Order entry, however, is considered mildly encouraging; most of the mills have booked more business for January shipment than they had for December delivery. A medium size producer figures that his January shipments will be 10 per cent above December's and 5 per cent higher than November's.

In the automotive industry, there's no clearcut trend. General Motors Corp. is keeping its purchases up pretty well as it continues high production, but Chrysler Corp. has been cutting back. Buying plans for January and February aren't definite yet, but steelmen look for a curtailment. Auto output is expected to average about 500,000 per month in the first quarter (vs. 600,000 per month in the fourth quarter this year).

Although the auto builders have fairly large steel inventories, manufacturers of automotive parts have cut their stocks to a minimum. That means they'll have to step up their steel buying next month

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even if there's no increase in car production.

A new, high speed, coil welding line has been placed in operation at U. S. Steel Corp.'s Youngstown Works. It will permit production of steel coils up to 30,000 lb, about four times the size of any previously produced at that works. The line will weld coils ranging from 5 to 38 in. wide and from 3/64 to 5/16 in. thick. An automatic coiling device was also installed.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 154

Despite the season, construction has been holding up fairly well in some areas. The situation is reflected in continued substantial movement of reinforcing steel. In general, it's expected that the holidays and winter weather will slow demand over coming weeks; a pickup is not likely until builders start figuring their spring needs.

Bethlehem Steel Co.'s plant at Seattle will fabricate 3500 tons of reinforcing bars for a Washington State highway project in Spokane County. About 20,000 tons of reinforcing steel are reported pending for a proposed ballistic missile complex at Malmstrom Air Base in Montana.

Steel Bars . . .

Bar Prices, Page 153

There's a little more life in the merchant bar market, largely reflecting increased demand on railroad account. General buying has picked up a little, but bolt and nut manufacturers and cold drawers continue to order hot bars sparingly. Warehouse requirements are steady.

Some consumers are still trimming inventories. Most of them are holding their new orders to needs. December has been no better than last month at some market centers, including Pittsburgh, but sellers are hoping for a pickup early in the new year. However, auto needs are expected to decline next month as the carmakers curtail assembly operations.

In the South, demand for cold drawn bars is reported running 15 to 20 per cent under that in the first half of the year. Only limited activity is reported in hot rolled.

Crucible Steel Co. of America,

Pittsburgh, has booked 216 tons, gun quality alloy squares, hot rolled, for the Springfield (Mass.) Armory. Wyckoff Steel Co., Pittsburgh, booked two contracts, 166 tons for the Navy, partly cold finished.

New forging bar contracts include: Titanium alloy bar stock, Watertown (Mass.) Arsenal to Reactive Metals Inc., Niles, Ohio, $195,668; alloy steel, Watervliet (N. Y.) Arsenal, $219,856, to Cabot Corp., Machinery Div., Pampa, Tex.; and steel forgings, Rock Island (Ill.) Arsenal, to Kropp Forge Co., Chicago at $36,627.

United Engineering Ships Big Mill Housing to Japan

United Engineering & Foundry Co., Pittsburgh, has shipped a 430,000 lb steel casting for a mill housing to Japan. It is for a plate mill that's under construction.

The casting was hauled to the Navy Yard at Brooklyn, N. Y., on a special, 32 wheel, railroad car. It'll be loaded on the *S. S. Kimikawa Maru*. The mill will be used mainly to roll ship plates. The housing was one of two cast at the Vandergrift, Pa., Works. Final machining was done in Youngstown.

Plates . . .

Plate Prices, Page 153

Platemakers are anticipating heavier sales in January. Orders have been stepped up and are more diversified. More tonnage is being figured for oil and chemical requirements, car needs, shipwork, and building construction. The improved outlook is encouraging producers to look for at least a moderate increase in business throughout the first quarter.

Deliveries remain easy, with sheared and universal plates available in ten days to two weeks, and specialties, including alloys, within two to five weeks.

Phoenix Steel Corp., which is terminating operations at its Harrisburg, Pa., plate mill, is considering rolling floor plate at its recently acquired plant at Claymont, Del. With the closing of the Harrisburg mill, the company is withdrawing from the market as a producer of universal plates.

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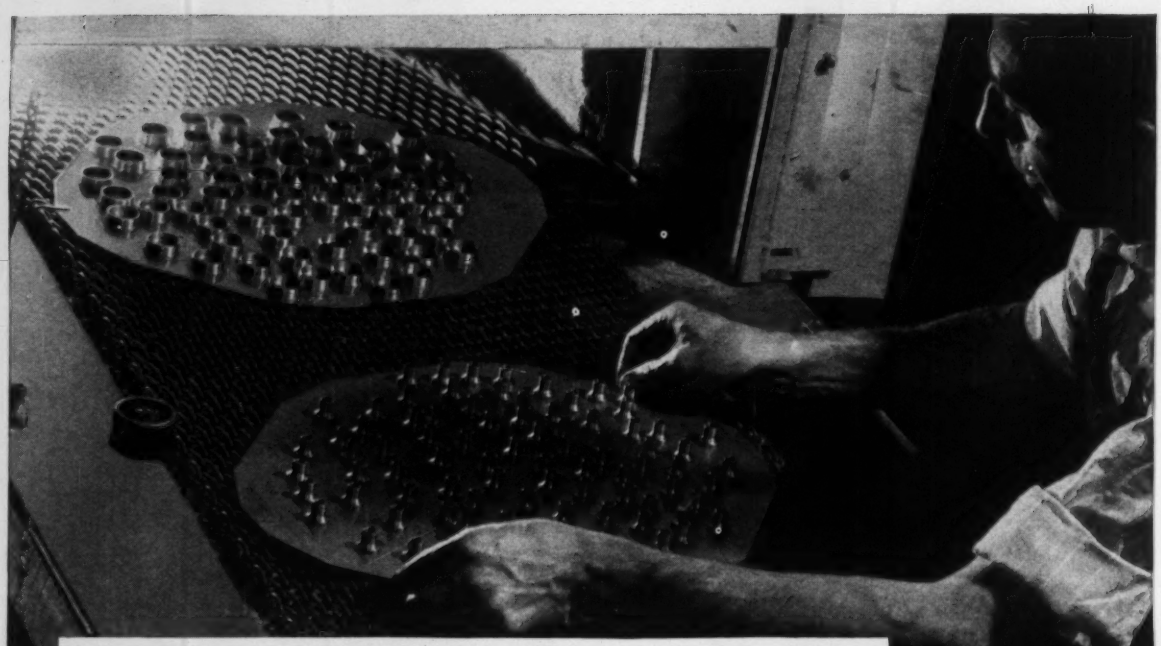

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Pending work includes 1000 tons of plates for an oil tank farm at Vancouver, Wash., 900 tons for a watertank for the city of Portland, Oreg., and 245 tons for a storage tank for Alderwood Manor, Wash.

Imports continue to plague the California market. Incoming shipments of plates, alone, were up roughly 190 per cent in September compared with August.

Wire . . .

Wire Prices, Pages 155 & 156

Fourth quarter wire volume is not up to expectations, and production is lower. Some specialty mills are operating at 45 to 50 per cent of capacity, the lowest point of the year. Some producers were averaging 70 to 75 per cent operations until recently.

The wire mills will enter the new year with small order backlogs, but that's true also of consumers in most cases. Buying is hand to mouth, and mill scheduling is difficult for economical production.

Several producers of screws and small fasteners are reported bringing out new designs involving changes in wire specifications.

Tubular Goods . . .

Tubular Goods Prices, Page 159

Shipments of standard pipe may drop as much as 10 per cent this month as users try to reduce their inventories and minimize their liability for yearend inventory taxes imposed by some states.

Distributors' stocks of merchant pipe aren't abnormally high. That's apparent from the urgency of their requests for fast deliveries. They often want items shipped within two or three days. If one supplier can't accommodate them, they find another who can.

Pipe sales executives expect next year's first quarter to be about the same as this year's fourth. They're not enthusiastic about the outlook for the first half in view of forecasts that housing starts may decline.

Oil well drilling is increasing. The number of rotary oil rigs in operation in the U. S. and Canada increased 34 in the latest weekly survey by Hughes Tool Co. The U. S. had 1835 rigs active, up 22; Canada had 153, up 12.

A $225 million project to include 1600 miles of gas pipelines from the Texas Gulf Fields to Reynosa, Mex., then northwest to Los Angeles, has been presented to the California State Public Utilities Commission by California Gas Transmission Co., subsidiary of Tennessee Gas Transmission Co., Houston, and Southern California Edison Co.

Foreign produced skelp has made its appearance in the California market. Imports in September amounted to 470 tons. None was received the preceding month.

Distributors . . .

Prices, Page 160

Steel service centers anticipate improved activity after the holidays. Some observers feel, however, it may be mid-1961 before steel business starts rolling at a good rate.

December bookings are holding up a little better than some distributors expected, although they are a trifle smaller than those recorded in November. Of the major products, light structurals and bars are moving best.

Reinstatement of the North American B-70 is expected to boost sales of titanium and other special metals, especially on the West Coast. Shipment of titanium from mills is on an 8 to 12 week delivery basis as the specialty metal market continues steady. Increased defense spending after the first of the year will boost sales, say Los Angeles distributors.

Tool Steel . . .

Tool Steel Prices, Page 159

Shipments of tool steels (excluding hollow drill steel) during October totaled 5990 net tons, reports the American Iron & Steel Institute. That compares with 5743 in the preceding month and with 6207 tons in October, 1959. Total movement for the first ten months this year was 75,382 tons vs. 78,483 in the same period last year.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 161

A battery of 51 coke ovens at Wheeling Steel Corp's East Steubenville (W. Va.) plant will be rebuilt by the Engineering & Construction Div., Koppers Co. Inc., Pittsburgh. The plant has six coke oven batteries with a total of 314 ovens. The battery to be rebuilt,

Ulbrich Revises Stainless Steel Strip Pricing

By William J. Nolle
Metal Market Staff Writer

WALLINGFORD, Conn.—The first broad changes in the pricing of specialty stainless cold rolled strip are being undertaken.

The revisions are being made by the Ulbrich Stainless Steels, Inc. through an adjustment of quantity extras. Included are some increases but the emphasis is on decreases ranging between 50% on quantity extras for small standard items and 5% on large quantity orders. The new prices will have

From "American Metal Market" July 14, 1960.

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No. 3, was built in 1926. The new ovens will be completed in 1961.

September Can Shipments Drop Under August Total

Shipments of tin cans in September totaled 552,946 tons, reports the Census Bureau. That compares with 600,605 tons in August this year and 642,080 in September, 1959. The total for the first nine months of the year was 3,721,048 tons vs. 3,951,126 in the same 1959 period.

The movement of fruit and fruit juice cans in September was 76,971 tons (vs. 131,443 in August), vegetable and vegetable juice cans 185,530 tons (vs. 148,705 in August). Shipments of fruit and fruit juice cans in the first nine months this year was 586,457 tons, vegetable and vegetable juice cans 641,557. In the same period last year, the overall total was 1,305,204 tons.

Beer can shipments in September amounted to 71,477 tons vs. 95,876 in August this year and 111,758 in September, 1959. The movement in the first nine months this year was 677,337 tons vs. 735,148 in the same period last year.

1960 Steel Output Headed For Sixth Highest Rank

Production of ingots and steel for castings in November fell to the lowest monthly level so far this year, totaling 6,167,000 net tons, reports the American Iron & Steel Institute.

Percentagewise, however, output was slightly higher at 50.5 per cent than that for July when the rate was 50.3 per cent—although output was 6,350,924 tons. The difference was due to the larger number of working days in July.

Output in October was 6,868,380 net tons, with the ingot rate averaging 54.5 per cent. In November, 1959, production totaled 7,267,607 tons, and the rate was 59.9 per cent (the industry was just starting up following the 116 day strike).

Production in the first 11 months this year totaled 93,436,820 net tons, vs. 81,456,813 tons in the same period last year. Operations in the first three weeks of December averaged about 49 per cent, which, if held, would bring output for the month to around 6 million tons, and the total for 1960 to about 99.4 million tons, sixth highest on record.

Steel Ingot Production—November, 1960

Period	OPEN HEARTH (Net tons)	BESSEMER (Net tons)	OXYGEN PROCESS (Net tons)	ELECTRIC (Net tons)	TOTAL (Net tons)	Percentage of capacity
1960						
January	10,510,616	211,132	280,981	1,046,675	12,049,404	98.5
February ...	9,715,527	215,263	245,456	949,553	11,126,806	94.3
March	10,103,122	202,812	306,741	952,008	11,564,683	91.6
1st Qtr	30,329,265	630,207	833,180	2,948,241	34,740,893	93.8
April	8,603,306	105,336	302,763	766,452	9,777,857	80.1
May	7,844,140	73,010	309,505	603,817	8,830,472	70.0
June	6,441,594	80,344	314,766	568,169	7,404,878	60.6
2nd Qtr	22,889,040	258,690	927,034	1,938,438	26,013,202	70.2
1st Half ...	53,218,305	888,897	1,760,214	4,886,679	60,754,095	82.0
July	5,494,331	61,700	289,003	505,890	6,350,924	50.3
August	5,860,394	52,652	279,550	645,404	6,838,000	54.2
September ..	5,525,244	42,228	287,323	603,626	6,458,421	52.9
3rd Qtr. ...	16,879,969	156,580	855,876	1,754,920	19,647,345	52.5
9 Mo.	70,098,274	1,045,477	2,616,090	6,641,599	80,401,440	72.1
*October ...	5,917,780	56,914	270,450	623,236	6,868,380	54.5
†November .	5,309,000	51,000	253,000	550,000	6,167,000	50.5
1959						
January	8,280,985	120,005	186,820	729,575	9,317,385	74.3
February ...	8,541,031	128,515	176,970	756,422	9,602,958	84.8
March	10,216,474	184,892	236,595	929,784	11,567,745	92.3
1st Qtr	27,038,490	433,412	600,385	2,415,781	30,488,068	83.8
April	9,884,322	195,730	237,018	964,850	11,281,920	93.0
May	10,117,968	200,887	257,325	1,024,401	11,600,581	92.5
June	9,521,053	185,794	259,731	941,056	10,907,634	89.9
2nd Qtr	29,523,343	582,411	754,074	2,930,307	33,790,135	91.8
1st 6 Mo. ..	56,561,833	1,015,823	1,354,459	5,346,088	64,278,203	87.8
July	4,541,741	66,433	98,634	525,368	5,232,176	41.7
August	1,171,342	.....	.....	267,935	1,439,277	11.5
September ..	1,249,398	.....	.....	285,619	1,535,017	12.7
3rd Qtr	6,962,481	66,433	98,634	1,078,922	8,206,470	22.1
9 Mo.	63,524,314	1,082,256	1,453,093	6,425,010	72,484,673	65.6
October	1,385,490	.....	.....	319,043	1,704,533	13.6
November ..	6,290,659	92,361	129,794	754,793	7,267,607	59.9
December ..	10,468,534	205,666	281,451	1,033,668	11,989,319	96.6
4th Qtr	18,144,683	298,027	411,245	2,107,504	20,961,459	56.3
2nd 6 Mo. ..	25,107,164	364,460	509,879	3,186,426	29,167,929	39.2
Totals	81,668,997	1,380,283	1,864,338	8,532,514	93,446,132	63.3

Note—The percentages are based on annual capacities as of Jan. 1, 1960: Open hearth, 126,621,630 net tons; bessemer, 3,396,000 net tons; basic oxygen process, 4,157,400 net tons; electric and crucible, 14,396,940 net tons. Total: 148,570,970 net tons. In 1959, the capacity tonnages were: Open hearth, 126,528,380 net tons; bessemer, 3,577,000 net tons; basic oxygen process, 4,033,160 net tons; electric and crucible, 13,495,130 net tons. Total: 147,633,670 net tons.
†Preliminary. *Revised.

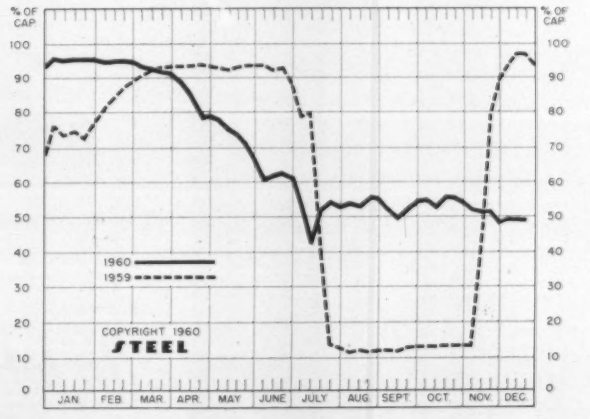
DISTRICT INGOT RATES

(Percentage of capacity utilized)

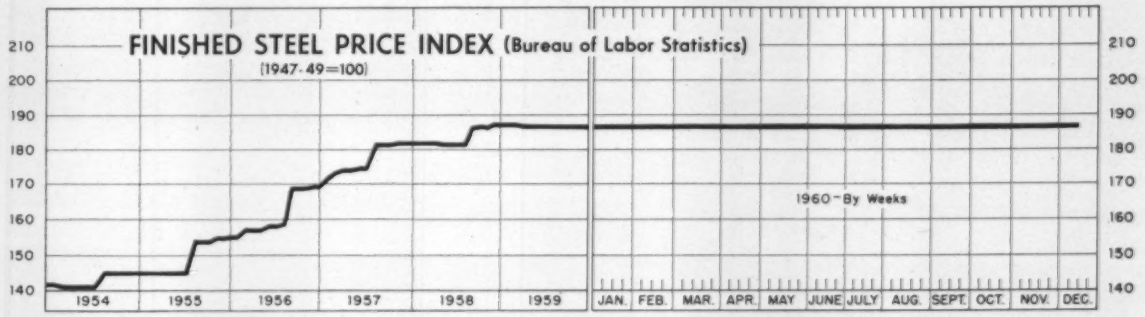
	Week Ended Dec. 18	Week Ago	Month Ago	Year Ago
Northeastern	52	51	54	101
Buffalo	41	39	53	104
Pittsburgh	46	47	49	98
Youngstown	38	36	38	93
Cleveland	42	46	55	100
Detroit	62	63	68	103
Chicago	50	52	53	94
Cincinnati	55	53	54	92
St. Louis	65	68	63	110
Southern	52	53	53	90
Western	52	52	48	96
Total Industry ..	48.7	49.0	51.6	96.3
Index ..... (1947-49=100)	86.3	86.9	91.5	169.7
Net Tons ..... (In thousands)	1,387	1,396	1,470	2,726

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Dec. 13, 1960	Week Ago	Month Ago	Nov. Index	Year Ago
186.2	186.2	186.2	186.2	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Dec. 13

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloys, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.335
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe, Line (100 ft)	195.430
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft.)	194.268
Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, Wire, 8d Common	9.433
Wire, Barbed (80-rod spool)	8.414
Woven Wire Fence (20-rod roll)	21.008

STEEL's FINISHED STEEL PRICE INDEX

	Dec. 14 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	208.90
Index in cents per lb	6.713	6.713	6.713	6.713	5.659

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.14
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	28.67	28.67	28.83	41.33	50.17

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec. 14 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.97	5.97	5.97	5.975	4.90
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.90
Shapes Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	4.88
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.25
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

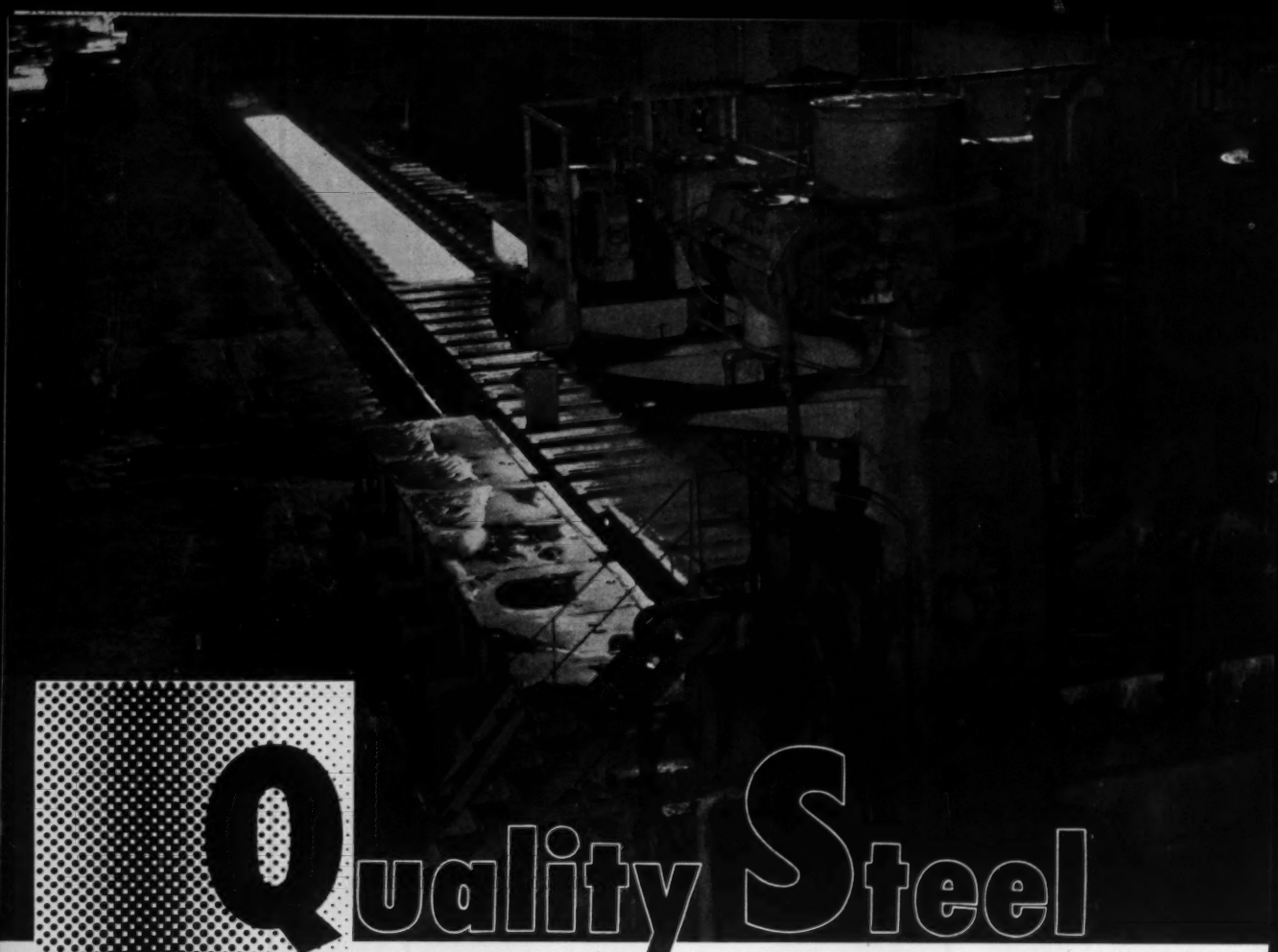
*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, 5/16-9/16" Pitts.	6.40	6.40	6.40	6.40	5.025

PIG IRON, Gross Ton	Dec. 14 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.41	62.16
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.91	62.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	53.00
No. 2 Fdry (Birm.), ueld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$26.50	$26.50	$26.50	$41.50	$50.00
No. 1 Heavy Melt, E. Pa.	34.00	34.00	34.00	42.00	50.00
No. 1 Heavy Melt, Chicago	25.50	25.50	26.00	40.50	50.50
No. 1 Heavy Melt, Valley	26.50	26.50	26.50	43.50	52.50
No. 1 Heavy Melt, Cleve.	23.50	23.50	23.50	40.50	50.50
No. 1 Heavy Melt, Buffalo	23.50	23.50	23.50	37.50	45.50
Rails, Rerolling, Chicago	46.50	46.50	46.50	61.50	73.50
No. 1 Cast, Chicago	36.50	36.50	36.50	54.50	50.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$13.625
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	26.25



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Steel Prices

Mill prices as reported to STEEL, Dec. 14, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 154; footnotes, page 156.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOTS, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rerolling (NT)
Bartonville,Ill. K4 ...$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 .104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 ....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ...99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14 .99.50
S.Duquesne,Pa. U5 ...99.50
S.SanFrancisco B3 ...109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14..122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ...5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 .....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ...5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 .5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 .....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5:50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1.8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 .....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1 .5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14 ..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 .....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 .....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Conshohocken,Pa. A3 ..6.375
Harrisburg,Pa. P4 ....6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ...5.675
Birmingham(9) C15 ....5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ...6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ...5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Kankakee(9) B2 .....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ...6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24, B3, N15 .6.425
S.Ch'e'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ...5.675
Torrance,Calif.(9) C11 ..6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ...6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Loaded (Including loaded extra) Carbon
LosAngeles P2, S30 ..11.75*
Alloy
Ambridge,Pa. W18 ..10.175
BeaverFall,Pa. M12 ..10.175
Camden,N.J. P13 ....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ....7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ...7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ...9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca, Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ...7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ..8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19..6.55

BARS, Cold-Finished Alloy
Ambridge Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2 ..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3..9.025
LosAngelesP2, S30 ....11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ..9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ...6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 ....7.33
KansasCity,Mo. S5 ....7.35
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R.)L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ...5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 .5.55
Marion,O.(3) P11 ...5.575
Tonawanda(3) B12 ...5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ...5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 ....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 ....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ....6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky.	A10 7.225	7.475
Canton,O.	R2 ...7.225	....
Fairfield,Ala.	T2 7.225	7.475
Gary,Ind.	U5 ...7.225	7.475
GraniteCity,Ill.	G4 7.325	....
Ind.Harbor	I-2 ..7.225	7.475
Irvin,Pa.	U5 ...7.225	7.475
Kokomo,Ind.	C16 7.325	....
MartinsFry.	W10 7.225	7.475
Pitts.,Calif.	C11 ..7.975	....
Pittsburgh	J5....7.225	....
SparrowsPt.	B2 ..7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 ....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala. City, Ala. (27) R2 ...5.10
Allenport, Pa. P7 .....5.10
Alton, Ill. L1 .....5.30
Ashland, Ky. (8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer, Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken, Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse, Mich. G5 .....5.10
Fairfield, Ala. T2 .....5.10
Farrell, Pa. S3 .....5.10
Fontana, Calif. K1 ....5.825
Gary, Ind. U5 .....5.10
Ind. Harbor, Ind. I-2, Y1..5.10
Johnstown, Pa. (25) B2...5.10
Lackaw'na, N.Y. (25) B2.5.10
LosAngeles (25) B3 .....5.85
LosAngeles C1 .....8.60
Minnequa, Colo. C10 ....6.20
Riverdale, Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle (25) B3 .....6.10
Seattle N14 .....6.60
Sharon, Pa. S3 .....5.10
S. Chicago, Ill. W14 .....5.10
S. SanFrancisco (25) B3 ..5.85
SparrowsPoint, Md. B2 ..5.10
Torrance, Calif. C11 ....5.85
Warren, O. R2 .....5.10
Weirton, W. Va. W6 .....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18 .....8.40
Farrell, Pa. S3 .....8.40
Gary, Ind. U5 .....8.40
Houston S5 .....8.65
Ind. Harbor, Ind. Y1 .....8.40
KansasCity, Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowellville, O. S3 .....8.40
Newport, Ky. A2 .....8.40
Sharon, Pa. A2, S3 .....8.40
S. Chicago, Ill. W14 .....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland, Ky. A10 .....7.575
Bessemer, Ala. T2 .....7.575
Conshohocken, Pa. A3 ..7.575
Ecorse, Mich. G5 .....7.575
Fairfield, Ala. T2 .....7.575
Farrell, Pa. S3 .....7.575
Gary, Ind. U5 .....7.575
Ind. Harbor, Ind. I-2, Y1 7.575
Lackawanna, N.Y. B2..7.575
LosAngeles (25) B3 ....8.325
Seattle (25) B3 .....8.575
Sharon, Pa. S3 .....7.575
S. Chicago, Ill. W14 ....7.575
S. SanFrancisco (25) B3 .8.325
SparrowsPoint, Md. B2 .7.575
Warren, O. R2 .....7.575
Weirton, W. Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10 ...5.35
Warren, O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn, Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover, O. G6 .....7.425
Evanston, Ill. M22 .....7.525
Farrell, Pa. S3 .....7.425
Follansbee, W. Va. W10 .7.425
Fontana, Calif. K1 .....9.20
FranklinPark, Ill. T6 ..7.525
Ind. Harbor, Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport, Pa. E10 ..7.525
NewBedford, Mass. R10.7.875
NewBritain, Conn. S15 .7.875
NewCastle, Pa. B4, M23 7.425
NewHaven, Conn. D2 ..7.875
NewKensington, Pa. A6.7.425
Pawtucket, R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale, Ill. A1 .....7.525
Rome, N.Y. (32) R6 ....7.425
Sharon, Pa. S3 .....7.425
Trenton, N.J. (31) R5 ..8.875
Warren, O. R2, T5 ....7.425
Worcester, Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie, Pa. S18 .....15.55
Dover, O. G6 .....15.55
Farrell, Pa. S3 .....15.55
FranklinPark, Ill. T6 ..15.55
Harrison, N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville, O. S3 .....15.55
Pawtucket, R.I. N8 ....15.90
Riverdale, Ill. A1 .....15.55
Sharon, Pa. S3 .....15.55
Worcester, Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn, Mich. S3 ....10.80
Dover, O. G6 .....10.80
Farrell, Pa. S3 .....10.80
Ind. Harbor, Ind. Y1 ....10.80
Sharon, Pa. S3 .....10.80
Warren, O. R2 .....10.80
Weirton, W. Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell, Pa. S3 .....7.50
Sharon, Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson, Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover, O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	9.05	10.40	12.60	15.60	....
Farrell, Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria, O. S1	10.05	10.40	12.60	15.60	....
FranklinPark, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison, N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain, Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle, Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven, Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington, Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon, Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	....	10.70	12.90	15.90	18.85
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7 T6 ..	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol, Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria, O. S1	19.05	22.15	....
FranklinPark, Ill. T6	19.20	23.30	28.15
Harrison, N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer, Mass. W12	18.85	....	....
Trenton, N.J. R5	18.85	22.95	27.80
Worcester, Mass. A7, T6 ..	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover, O. G6 .....7.425*
Evanston, Ill. M22 ....7.525*
McKeesport, Pa. E10 ...7.50*
NewCastle, Pa. M23 ..7.425*
Riverdale, Ill. A1 .....7.525*
Warren, O. B9, S3, T5.7.425*
Worcester, Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell, Pa. S3 .....5.525
Riverdale, Ill. A1 .....5.675
Sharon, Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa, Pa. J5	$9.10	$9.35	$9.75
Fairfield, Ala. T2	9.20	9.45	9.85
Fairless, Pa. U5	9.20	9.45	9.85
Fontana, Calif. K1	9.75	10.00	10.40
Gary, Ind. U5	9.10	9.35	9.75
GraniteCity, Ill. G4	9.20	9.45	9.85
IndianaHarbor, Ind. I-2, Y1	9.10	9.35	9.75
Irvin, Pa. U5	9.10	9.35	9.75
Niles, O. R2	9.10	9.35	9.75
Pittsburg, Calif. C11	9.75	10.00	10.40
SparrowsPoint, Md. B2	9.10	9.35	9.75
Weirton, W. Va. W6	9.10	9.35	9.75
Yorkville, O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa, Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor, Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles, O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box 45 lb	50 lb	55 lb	60 lb
Fairfield, Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless, Pa. U5	6.20	6.35	6.50	6.65
Gary, Ind. U5	6.10	6.25	6.40	6.55
Irvin, Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint, Md. B2	6.10	6.25	6.40	6.55

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$10.40	$10.65
Fairfield, Ala. T2	10.50	10.75
Fontana, Calif. K1	11.05	11.30
Gary, Ind. U5	10.40	10.65
Irvin, Pa. U5	10.40	10.65
Pitts., Calif. C11	11.05	11.30
Sp. Pt., Md. B2	10.40	10.65
Weirton, W. Va. W6	10.40	10.65
Yorkville, O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa, Pa. J5	$8.20
Fairfield, Ala. T2	8.30
Fairless, Pa. U5	8.30
Fontana, Calif. K1	8.85
Gary, Ind. U5	8.20
GraniteCity, Ill. G4	8.30
Ind. Harbor, Ind. I-2, Y1	8.20
Irvin, Pa. U5	8.20
Niles, O. R2	8.20
Pittsburg, Calif. C11	8.85
SparrowsPoint, Md. B2	8.20
Weirton, W. Va. W6	8.20
Yorkville, O. W10	8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa, Pa. J5	7.85
Gary, Ind. U5	7.85
GraniteCity, Ill. G4	7.95
Ind. Harbor, Ind. Y1	7.85
Irvin, Pa. U5	7.85
Yorkville, O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W. Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge, Pa. A4	....	....	12.40	13.55	14.65
GraniteCity, Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor, Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield, O. E6	9.875*	11.70	12.40	13.55	14.65
Newport, Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles, O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift, Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren, O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65
					Stator
Mansfield, O. E6					8.10
Vandergrift, Pa. U5					8.10
Warren, O. R2 (Locore)					8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom, W. Va. W10	15.70	16.30	16.80	17.85
Zanesville, O. A10	15.70	16.30	16.80	17.85
Vandergrift, Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler, Pa. A10	....	....	....	19.70	20.20	20.70 ....
Vandergrift, Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren, O. R2	....	....	....	....	....	.... 15.70‡

*Semiprocessed. †Fully processed only. ‡Coil, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity, Ala. R2 ..8.00
Aliquippa, Pa. J5 .....8.00
Alton, Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville, Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville, Ind. M8..8.10
Donora, Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield, Ala. T2 .....8.00
Fostoria, O. (24) S1 .....8.10
Houston S5 .....8.25
Jacksonville, Fla. M8 ...8.35
Johnstown, Pa. B2 .....8.00
Joliet, Ill. A7 .....8.00
KansasCity, Mo. S5 .....8.25
Kokomo, Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa, Colo. C10 ....8.25
Monessen, Pa. P7, P16...8.00
Palmer, Mass. W12 ....8.30
Pittsburg, Calif. C11 ....8.95
Portsmouth, O. P12 .....8.00
Rankin, Pa. A7 .....8.00
S. Chicago, Ill. R2 .....8.00
S. SanFrancisco C10 ....8.95
SparrowsPoint, Md. B2 ..8.10
Sterling, Ill. (1) N15 ....8.00
Sterling, Ill. N15 .....8.10
Struthers, O. Y1 .....8.00
Waukegan, Ill. A7 .....8.00
Worcester, Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria, O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville, Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora, Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown, Pa. B2 .....13.40
KansasCity, Mo. U3 ...12.90
Minnequa, Colo. C10 ..12.775
Monessen, Pa. P7, P16..12.65
Muncie, Ind. I-7 .....13.60
NewHaven, Conn. A7 ..12.95
Palmer, Mass. W12 ....13.70
Pittsburg, Calif. C11 ...13.45
Portsmouth, O. P12 ....12.65
Roebling, N.J. R5 .....12.95
SparrowsPt., Md. B2 ...13.50
Struthers, O. Y1 .....13.40
Trenton, N.J. A7 .....12.95
Waukegan, Ill. A7 .....12.65
Worcester, Mass. A7 ....12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5 .....9.75
Alton, Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora, Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown, Pa. B2 .....9.75
KansasCity, Mo. S5, U3.10.00
Kokomo, Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa, Colo. C10 ....9.95
Monessen, Pa. P7, P16...9.75
NewHaven, Conn. A7 ...10.05
Palmer, Mass. W12 ....10.05
Pittsburg, Calif. C11 ...10.70
Portsmouth, O. P12 .....9.75
Roebling, N.J. R5 .....10.05
S. Chicago, Ill. R2 .....9.75
S. SanFrancisco C10 ....10.70
SparrowsPt., Md. B2 ...9.85
Struthers, O. Y1 .....9.75
Trenton, N.J. A7 .....10.05
Worcester, Mass. A7 ....10.05

WIRE, MB Spring, High-Carbon

Aliquippa, Pa. J5 .....9.75
Alton, Ill. L1 .....9.95
Bartonville, Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora, Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria, O. S1 .....9.80
Johnstown, Pa. B2 .....9.75
KansasCity, Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Millbury, Mass. (12) N6 .10.05
Minnequa, Colo. C10 ....9.95
Monessen, Pa. P7, P16 ..9.75
Muncie, Ind. I-7 .....9.95
Palmer, Mass. W12 ....10.05
Pittsburg, Calif. C11 ...10.70
Portsmouth, O. P12 .....9.75
Roebling, N.J. R5 .....10.05
S. Chicago, Ill. R2 .....9.75
S. SanFrancisco C10 ....10.70
SparrowsPt., Md. B2 ....9.85
Struthers, O. Y1 .....9.75
Trenton, N.J. A7 .....10.05
Waukegan, Ill. A7 .....9.75
Wor'ster, Mass. A7, J4, T6 10.05

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1 .....16.50
Bartonville, Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville, Ind. M8..16.40
Fostoria, O. S1 .....16.30
Houston S5 .....16.55
Jacksonville, Fla. M8 ...16.65
Johnstown, Pa. B2 .....16.30
KansasCity, Mo. S5 ....16.55
Kokomo, Ind. C16 .....16.30
Minnequa, Colo. C16 ....16.55
Monessen, Pa. P16 .....16.30
Muncie, Ind. I-7 .....16.50
Palmer, Mass. W12 .....16.60
S. SanFrancisco C10 ....17.15
Waukegan, Ill. A7 .....16.30
Worcester, Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville, Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria, O. S1 .....13.45
Johnstown, Pa. B2 .....13.45
Monessen, Pa. P7 .....13.45
Muncie, Ind. I-7 .....13.65
Palmer, Mass. W12 ....13.75
Portsmouth, O. P12 ....13.45
Roebling, N.J. R5 .....13.75
St. Louis L8 .....13.45
SparrowsPt., Md. B2 ...13.55
Struthers, O. Y1 .....13.45
Worcester, Mass. J4 ....13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Sing'e Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	216
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	.193**
Aliquippa,Pa. J5	.190§
Atlanta A11	.197*
Bartonville,Ill. K4	.199
Crawfordsville,Ind. M8	.198
Donora,Pa. A7	.193†
Duluth A7	.193†
Fairfield,Ala. T2	.193†
Houston S5	.198**
Jacksonville,Fla. M8	.198
Johnstown,Pa. B2	.196§
Joliet,Ill. A7	.193†
KansasCity,Mo. S5	.198**
Kokomo,Ind. C16	.195†
Minnequa,Colo. C10	.198**
Monessen,Pa. P7	.196§
Pittsburg,Calif. C11	.213†
Rankin,Pa. A7	.193†
S.Chicago,Ill. R2	.193**
SparrowsPoint,Md. B2	.198§
Sterling,Ill.(7) N15	.198

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	
Cleveland A7	17.85	
Craw'sville M8	17.95	19.80†‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala R2	.187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	1½1*
Bartonville,Ill. K4	.193
Crawfordsville,Ind. M8	.192
Donora,Pa. A7	.187†
Duluth A7	.187†
Fairfield,Ala. T2	.187†
Houston S5	.192**
Jacksonville,Fla. M8	.192
Johnstown,Pa.(42) B2	.190§
Joliet,Ill. A7	.187†
KansasCity,Mo. S5	.192**
Kokomo,Ind. C16	.189†
Minnequa,Colo. C10	.192**
Pittsburg,Calif. C11	.210†
Rankin,Pa. A1	.187†
S.Chicago,Ill. R2	.187**
Sterling,Ill.(7) N15	.192

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11.	9.00	9.75*
Bartonville(48)K4	9.85	19.90
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.66‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.
Structural ½ in. larger 12.85
⅞ in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS,

coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:

Packaged	+ 5
Bulk	19

Through 1 in. diam., longer than 6 in.:

Packaged	+29

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Standard All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

an education in itself—

"The gleam of Stainless Steel"

displayed at your favorite store

As one in the metals fabricating business—whether design, production or purchasing—you'll have a special interest in the stainless products for the home now featured at your leading store. The eye-opening promotion of variety, beauty and utility in stainless home products today is doubly impressive to the man who sees the technical accomplishments behind the glamor. • Many of the pieces will have been crafted from SUPERIOR Stainless Strip Steel—chosen for uniform highest quality in every coil. Specify it safely for your strictest demand.

Superior

STAINLESS STRIP STEEL

SUPERIOR STEEL DIVISION

OF

COPPERWELD STEEL COMPANY

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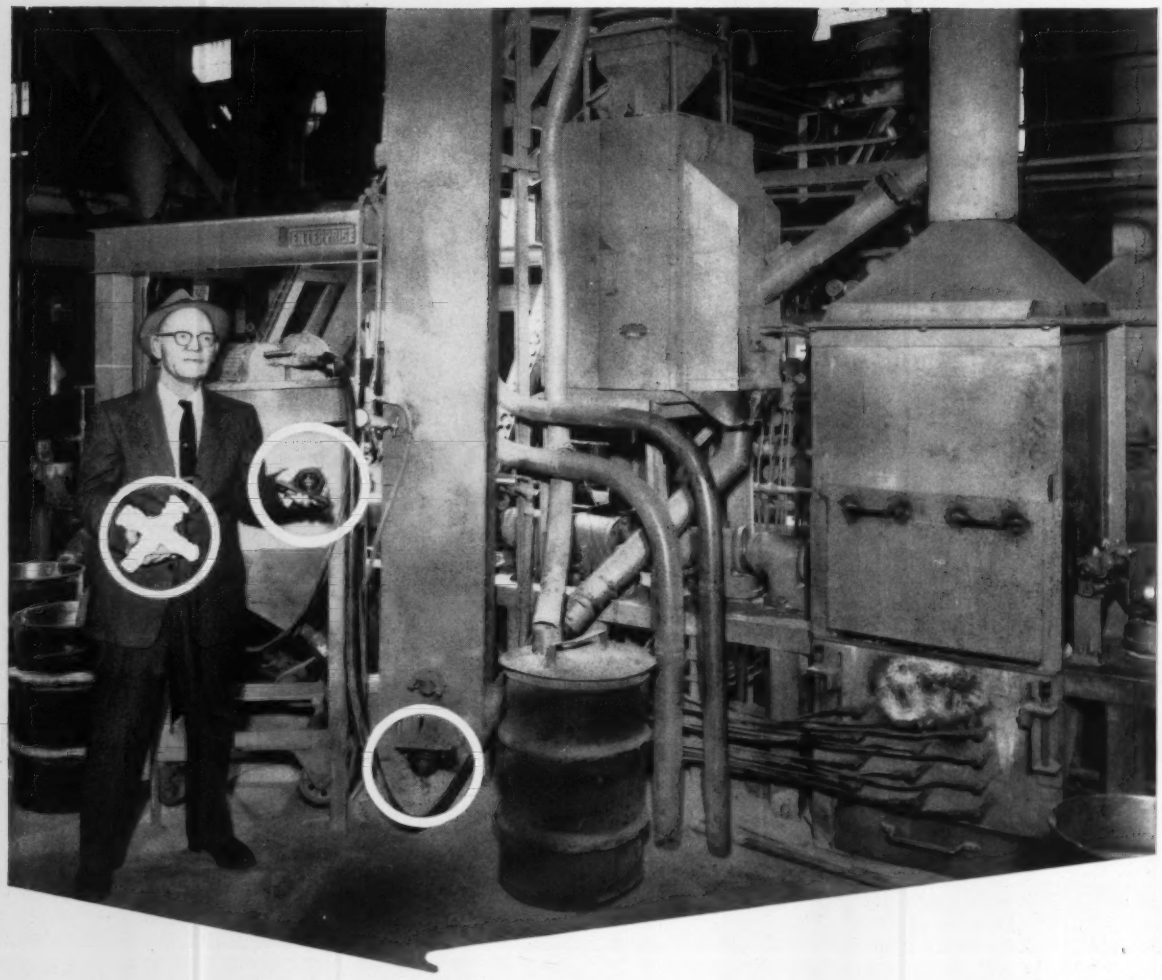

Bearings, Inc. recommended a better seal, a better bearing and savings are $700.00 a year!

Here's a maintenance foreman who knew where to get help when bearings in his care failed prematurely. He called a Bearings, Inc. engineer when the bearings in this bucket elevator conveyor failed after only two weeks of use.

The Bearings, Inc. engineer found that the powdered zinc transmitted by the conveyor was responsible for the failure. Powdered zinc had worked through the bearing seal and since zinc joins itself when rubbed between two surfaces, being rubbed between the balls and bearing race led to a build-up that stopped the bearings in their tracks.

Analysis of loads and speeds showed a less expensive bearing would work well if its seal would shut out all dirt. The original bearings cost $16.79 each — the replacement only $7.36! This meant a net saving of $700 in bearing costs alone. Now in operation for two years the bearings have been replaced only once.

Bearings, Inc. sales engineers sell only products we are authorized to sell. No deals, no "just as good as" substitutes. Call the branch nearest you — The bearings you want are in stock ready for delivery.

Providing bearing service in the North → **BEARINGS, INC.**

DELAWARE: Wilmington • **ILLINOIS:** Neiman Bearings Co., E. St. Louis • **INDIANA:** Ft. Wayne • Indianapolis • Muncie • Terre Haute • **MARYLAND:** Baltimore • **MISSOURI:** Neiman Bearings Co., St. Louis • **NEW JERSEY:** Camden • Newark • **NEW YORK:** Balanrol Corp., Buffalo • Niagara Falls • **OHIO:** Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Painesville • Toledo • Youngstown • Zanesville • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York • **WEST VIRGINIA:** Charleston • Huntington • Parkersburg • Wheeling

and

in the South → **DIXIE BEARINGS, INC.**

ARKANSAS: Little Rock • **FLORIDA:** Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville • **LOUISIANA:** Baton Rouge New Orleans • **N. CAROLINA:** Charlotte • Greensboro • **S. CAROLINA:** Greenville • **TENNESSEE:** Chattanooga • Kingsport • Knoxville Memphis • Nashville • **VIRGINIA:** Norfolk • Richmond • Roanoke

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structurol Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates— 5% Carbon Base	10%	15%	20%	Sheets 20% Carbon Base
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.35	43.40

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y., R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb pigiets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	8.66	10.06	....	8.28	8.55	11.70	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.65	9.80	11.25	55.98	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	9.87	11.22	10.30	....	10.86	9.67	12.68	....	9.88	9.82	11.46
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	8.74	10.26	10.20	65.30	11.06	8.87	11.53	16.27	9.47	8.79	11.01
Cleveland	8.57	9.88	11.24	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	8.83	10.46	10.50	52.00	11.11	8.86	11.01	16.23	9.47	8.78	10.94
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.01	10.64	10.59	....	11.18	8.99	11.09	16.39	9.35	8.85	11.12
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	8.95	11.20	11.45	61.27	10.65	9.00	14.20	17.35	9.90	8.40	11.15
Memphis, Tenn.	8.98	10.05	....	....	10.64	8.82	12.74	....	9.01	8.66	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	8.92	10.55	10.50	....	10.90	8.90	11.00	16.30	9.26	8.76	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	52.98	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.35	9.60	10.66	52.71	10.35	8.75	11.95	16.38	8.95	8.70	9.95
Pittsburgh	8.57	9.88	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.68
Portland, Oreg.	9.45	11.30	12.35	....	11.45	9.45	16.65	17.80	10.05	9.60	11.75
St. Louis	8.77	10.58	10.53	....	10.94	8.77	11.28	16.33	9.14	8.62	10.91
St. Paul	8.84	9.59	10.84	....	11.01	8.82	11.49	16.54	9.18	8.68	10.44
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.51	11.57	12.50	54.02	11.95	9.94	16.20	17.80	10.65	10.10	12.73
Spokane, Wash.	10.36	11.42	12.35	54.02	11.80	9.79	16.20	17.80	10.50	9.95	12.58

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ⅝ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅝ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted.)

Billets, Blooms & Slabs:
Carbon (N.T.):
Forging $97.00
Rerolling 78.00
Alloy (N.T.) 115.00

Wire Rods:
Carbon 5.70
Alloy 6.40

Wire (carload lots):
Merchant annealed .. 8.40
Low carbon indus. .. 7.20
Upholstery spring .. 8.55
M.B. spring 8.85

Bars & Small Shapes:
Carbon, merchant .. 5.30
Carbon, special 5.85
Alloy 6.40

Bar Mill Bands:
Carbon 5.40
Alloy 8.05

Bars, Reinforcing 5.30

Structural Shapes:
Standard carbon ... 5.50
Angles & zees 5.40

Plates, Carbon:
Sheared 5.45
Universal mill 5.10

Sheets & Coils, Hot Rolled:
Carbon sheet 4.95
Carbon strip 5.00

Sheets & Coils, Cold Rolled:
Carbon sheet 6.35
Carbon strip:
(0.080 and lighter) 6.35
(0.081 and heavier) 6.65

Sheets & Coils, Galvanized:
Standard quality ... 6.70
Culvert quality 7.00

Sheets, Porcelain Enameling 7.45

Sheets & Coils, Electrical:
Field grade 9.00
Armature grade 9.50
Electrical grade ... 10.15

Sheet Piling 6.15

Skelp 4.70

Rails, Heavy 5.55

Rails, Light 5.70

Joint Bars 6.55

Tie Plates 6.35

Grinding Balls (3 in. diam.) 7.00

Tin Mill Products (Per base box; 100 lb base wt)
Coke tin plate (1.25 lb pot yield) $10.60
Electrolytic tin plate (0.25 lb coating). 9.10
Black plate 8.30

Nails, Wholesale:
Carload lots .....Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min., truck lots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85§
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ¼ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe.	36.75, ton. del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh) ..	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, $8.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.60
Bronze powder, 90/10.	55.20
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types ..	0.78-1.06
Nickel-Silver	58.80
Solder	8.00*
Stainless Steel, 304 ..	89.00
Stainless Steel, 316 ..	$1.07
Steel, AISI 4450	32.00
Tin	14.00*
Zinc	24.70
Cobalt:	Dollars
98.5%, minus 100-300 mesh ..	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. †Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305 ...	$5.42	....	$5.32	$5.17	$5.52
Bar Size Angles	5.55	....	5.45	5.30	5.65
Structural Angles	5.45	....	5.35	5.20	5.55
I-Beams	5.45	....	5.35	5.20	5.55
Channels	5.45	....	5.35	5.20	5.55
Plates (basic bessemer)	5.70	....	5.60	5.45	5.80
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.50	....	24.70	24.70	25.50
Barbed Wire (†)	6.25	....	6.15	6.00	6.35
Merchant Bars	5.55	....	5.45	5.30	5.65
Hot-Rolled Bands	5.85	....	5.75	5.60	5.95
Wire Rods, Thomas Commercial No. 5	6.05	....	5.95	5.95	6.25
Wire Rods, O. H., No. 5	6.25	....	6.15	6.15	6.45
Bright Common Wire Nails (§)	6.85	....	6.75	6.60	6.95

*Book closed for 1960-61 shipping season. †Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer $11.60
Lump ½ in. and up 12.85
Fines, under ½ in. 10.72
Mesabi nonbessemer 11.45
Old Range bessemer 11.85
Old Range nonbessemer 11.70
Open-hearth lump 12.70
High phos. 11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates .....nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports 23.00†
Chilean, 62-65%, c.i.f. Atlantic ports .. 22.00
Brazilian, 68.5% f.o.b. vessel,
Victoria, per ton $11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality $19.75-20.00*
Domestic, concentrates, f.o.b. milling points 22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charlestown, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1 .....$34.00-35.00†
48% no ratio .....25.00-26.00†

South African Transvaal

44% no ratio .....18.75†
48% no ratio .....24.00-26.00†

Turkish

48% 3:1 .....36.00-37.00†

Domestic

Rail nearest seller

18% 3:1 ..... 30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60% $2.50-2.80
60-65% 2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic 31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace $14.75-15.25
Connellsville, Pa., foundry 18.00-18.50

Oven Foundry

Birmingham, ovens $30.35
Cincinnati, deld. 33.34
Buffalo, ovens 32.00
Chattanooga, Tenn., ovens 30.80
Detroit, ovens 32.00
Pontiac, Mich., deld. 34.05
Saginaw, Mich., deld. 35.63
Erie, Pa., ovens 32.00
Everett, Mass., ovens:
New England, deld. 33.55*
Indianapolis, ovens 31.25
Ironton, Ohio, ovens 30.50
Cincinnati, deld. 33.64
Kearny, N. J., ovens 31.25
Milwaukee, ovens 32.00
Neville Island (Pittsburgh), Pa., ovens. 30.75
Painesville, Ohio, ovens 32.00
Cleveland, deld. 34.45
Philadelphia, ovens 31.00
St. Louis, ovens 33.00
St. Paul, ovens 31.25
Chicago, deld. 34.78
Swedeland, Pa., ovens 31.00
Terre Haute, Ind., ovens 31.25

*Within $5.25 freight zone from works.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene 34.00
Xylene, industrial grade 29.00
Creosote 24.00
Naphthalene, 78 deg. 6.00
Toluene, one deg. (deld. east of Rockies) 25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade 14.75

Per net ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade $32.00

Ferroalloys

MANGANESE ALLOYS

Spiegreisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa. 21-23% Mn, $102.50; 19-21% Mn. 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 38.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 50-56%, C 6-8%, Si 4-7%, 22.00c; Cr 58-63%, C 5.8%, Si 3-6%, 22.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 53-63%, C 3-5%, Si 2.5% max, 26.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 33.50c per lb contained Cr; 0.010% max, 34.50c. Delivered.

Cr, 65-71%, carload, lump, bulk, 0.025% max, 35.00c; 0.05% max, 34.00c; 0.10% max, 33.75c; 0.20% max, 33.50c; 0.50% max, 33.25c; 1.0% max, 33.00c; 1.5% max, 32.75c; 2.0% max, 32.50c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.0c per lb of alloy carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 24.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 24.50c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down, 26.25c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ½" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb, (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20% per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-3 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

Pig Iron . . .

Pig Iron Prices, Page 160

With many foundries closing over the Christmas holiday week, demand for merchant pig iron will end the year at a low level. Producers expect an improvement in January, although they look for a continuation of hand to mouth buying.

Blast furnace operations are sagging. Production is down sharply in the Buffalo district. Tonawanda Iron Div., American Radiator & Standard Sanitary Corp., announced the closing of its blast furnace at North Tonawanda, N. Y., for a couple of months. Reason: Inventory adjustment.

Bethlehem Steel Co. shut down a blast furnace at its Lackawanna, N. Y., plant due to reduced need for hot metal to feed open hearths. Bethlehem now has only two active blast furnaces out of seven at that plant.

Republic Steel Corp. closed down its blast furnace at Troy, N. Y., for an indefinite period because of a lack of orders.

Structural Shapes . . .

Structural Shape Prices, Page 153

Considerable bridge and road construction work continues active in the market. Also, more school and institutional construction jobs are up for bids. Most fabricating shops have sufficient work to maintain operations at a fair level. Competition, however, continues keen for all new work.

Fabricators in the Pacific Northwest were surprised by an unexpected pickup in requests for figures on a number of new projects. Pending work includes a ten story business block in Seattle, construction of Seattle's 21 Century Exposition, additions to the Boeing airplane plant, activity at the Atomic Energy Commission's Hanford Works, a state ferry terminal at Seattle, and several crane contracts on which Tacoma (Wash.) fabricators are bidding.

Plain material is readily available; fabricators report no difficulty in obtaining shipments from mills and warehouses. Mill shipments of standard shapes now run two to four weeks.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4125 tons, first contract, $15 million, cargo-passenger terminal, main channel, Port of Los Angeles, to American Bridge Div., U. S. Steel Corp., Pittsburgh.

2325 tons, 12 story building, Denver Public Service Co., Denver, to Burkhardt Steel Co., Denver; Mead & Mount Construction Co., Denver, general contractor.

1550 tons, garage and stores, redevelopment project, New Haven, Conn., to Bethlehem Steel Co., Bethlehem, Pa. (structurals), and Truscon Steel Div., Republic Steel Corp., New York (reinforcing bars); Fusco-Amatruda Co., New Haven, general contractor.

996 tons, bridge, Section 1-F, over Rock River, Rockford, Ill., for Illinois Division of Highways, to Allied Structural Steel Companies, Chicago.

800 tons, Nassau County welfare home, New York, through Leon De Matties, general contractor, to Simon Holland & Son Inc., Brooklyn, N. Y.

750 tons, sheet piling, Markland locks and dam, Ohio, or Madison, Ind., to Weirton Steel Div., National Steel Corp., Weirton, W. Va.

650 tons, municipal powerplant, Dover, Del., to Frank M. Weaver & Co., Lansdale, Pa.; corrects error as to location in a recent issue.

600 tons, Idaho State, Clearwater River bridge, 180 tons; reinforcing bars also involved; to American Bridge Div., U. S. Steel Corp., Portland, Oreg.; general contract to W. R. Cahoon Construction Co., Pocatello, low at $627,399.

515 tons, grade separation for South Expressway at 47th Street, Chicago, for Illinois Division of Highways, to Allied Structural Steel Companies, Chicago.

500 tons, grade separation to carry Garfield Boulevard over South Expressway at 55th Street, Chicago, for Illinois Division of Highways, to Wendnagel & Co. Inc., Chicago.

500 tons, intake gates, Smith Mountain Dam, Appalachian Power Co., Roanoke, Va., to American Bridge Div., U. S. Steel Corp., Pittsburgh.

340 tons, grade separation to carry Root Street over South Expressway, Chicago, for Illinois Division of Highways, to Allied Structural Steel Companies, Chicago.

306 tons, grade separation for South Expressway at 43rd Street, Chicago, for Illinois Division of Highways, to Allied Structural Steel Companies, Chicago.

302 tons, state bridgework, HSP 50-1, Suffolk County, New York, through Hendrickson Bros., to American Bridge Div., U. S. Steel Corp., Pittsburgh.

270 tons, bus terminal, Port of New York Authority, New York, through Starrett Bros. & Eken Inc., to Harris Structural Steel Co., New York.

210 tons, state bridgework, SSPRC 50-1, Suffolk County, New York, through Hendrickson Bros., to Phoenix Bridge Co., Phoenixville, Pa.

125 tons, state highway bridge, Route 6, Conway-Bartlett, N. H., to Bethlehem Steel Co., Bethlehem, Pa.; Munroe & Langstroth Inc., Norwood, Mass., contractor; reinforcing bars also to Bethlehem Steel Co.

70 tons, booster pumping plant, Chief Joseph Dam, to Isaacson Iron Works, Seattle.

STRUCTURAL STEEL PENDING

16,000 tons, 18 Titan, 11 missile silos, Air Force Base, Tucson, Ariz.

4000 tons, federal courthouse and office building, Chicago, A. L. Jackson, Chicago, low on the general contract.

3500 tons, Buffalo and Erie County Library, Buffalo, John W. Copper, Buffalo, general contractor.

3005 tons, state road work, FAC 60-125 and FASH 60-12, Orange County, New York, B. W. Winkelman, Syracuse, N. Y., low on the general contract.

1750 tons, nurses' home, Bronx Municipal Hospital, New York; Terminal Construction Co., Fort Lee, N. J., low on the general contract.

1340 tons, Carteret interchange, New Jersey Turnpike Authority, Middlesex and Union counties, New Jersey; Public Constructors, Camden, N. J., low on the general contract.

1112 tons, state bridgework, Washington County, Pennsylvania, bids Dec. 29; also, 570 tons of reinforcing bars.

1000 tons, building No. 4, campus site, State University of New York, Albany; Webseo Construction Co., Long Island City, N. Y., low on the general contract.

786 tons, state bridgework, Chester County, Pennsylvania, bids Dec. 12; also, 696 tons of reinforcing steel.

770 tons, Maxwell Locks, Corps of Army Engineers, Brownsville, Pa.

600 tons, Port of Kalama, Wash., elevator; Isaacson Iron Works, Seattle, reported low to general contractors.

590 tons, warehouse, American Sugar Refining Co., Brooklyn, N. Y.; bids closed Nov. 27.

500 tons, south wing, Lawrence Hospital, Bronxville, N. Y.; bids closed Dec. 1.

(*Please turn to Page* 172)

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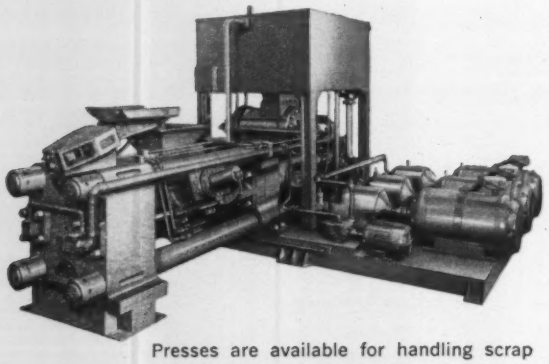

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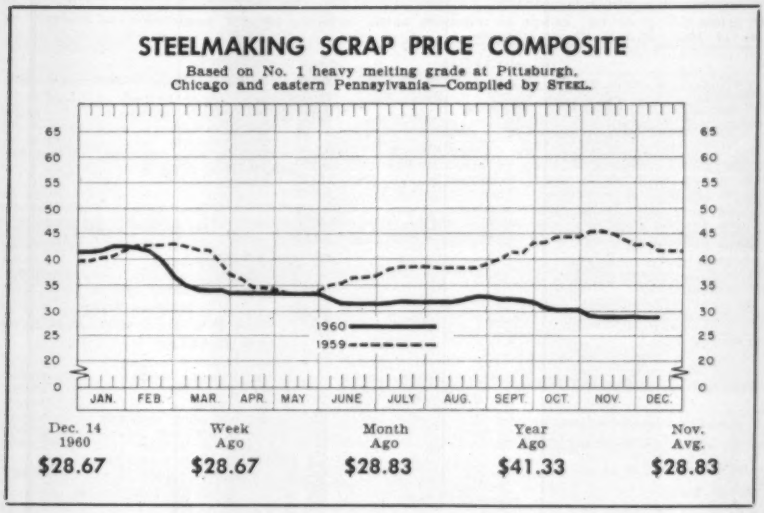


Scrap Dawdles as Holidays Near

Lackluster market reflects sluggish steel operations and consumer reluctance to place orders despite attractive level of prices. STEEL's composite unchanged at $28.67

Scrap Prices, Page 166

● **Pittsburgh**—The market is in its traditional yearend slump. Buying interest is negligible because of the emphasis on inventory control. Heavy snow and low prices are discouraging the flow of scrap to dealers' yards. Observers think prices will move up gradually after the turn of the year. Brokers' bids on Pennsylvania Railroad scrap were $1 to $2 a ton higher than those a month ago.

● **Chicago**—The market is colorless, with buying at a standstill and prices holding unchanged. The first quarter holds no exciting prospects, but despite the dull outlook, consumers are making no effort to force prices down. In fact, indications are that the market has bottomed out. Demand for castings is following the same pattern as steel, so requirements for foundry scrap are dragging, with prices unchanged.

● **Philadelphia**—Severe snow storms and cold weather have greatly reduced the movement of scrap. Dealers could get little tonnage in or out of yards for several days. This tended to stiffen the market, although there have been no price changes. Major support, however, still stems from orders for open hearth material for export.

● **New York**—Brokers' buying prices on carbon steel scrap and cast are unchanged, except for a further nominal reduction in borings and turnings. Machine shop turnings are now quoted $3.50-$4, mixed borings and turnings $4-$4.50, and shoveling turnings $5-$6—a $1 reduction in each case. Heavy snows and cold weather slowed shipments.

● **Cleveland**—Brokers and dealers look for little change in the market over the next several weeks. The holidays will bring further curtailments in steelmaking and the mills are unlikely to show much interest in scrap until after the first of the year. The ingot rate here now is 42 per cent of capacity; in Youngstown it is 38. Extensive closing down of blast furnaces is likely to increase steelmakers' dependence on scrap in their steel melts early in 1961.

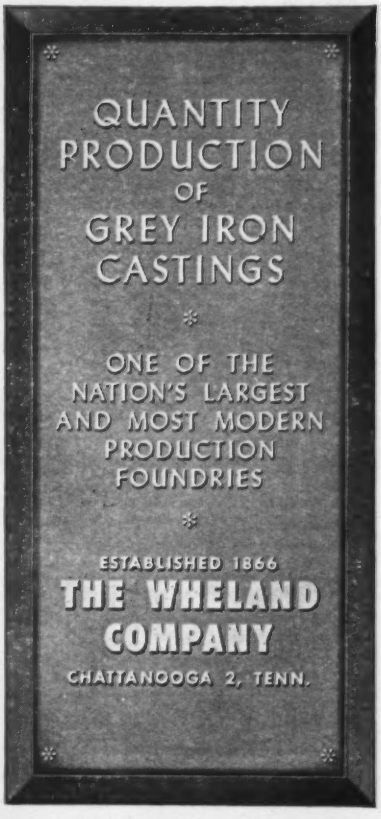
● **Buffalo**—District steel mills are out of the market and relatively little demand is coming from foundries in the area. Prices remain unchanged at the low levels recently established. They are largely nominal in the absence of buying. The flow of scrap from all generating sources has dropped sharply, the low prices offered by dealers being too unattractive to bring out tonnage.

● **Detroit**—The market is steady, but no orders are being placed. Dealers and brokers expect little action until next month. Some anticipate a slight increase in prices, but there's nothing in the market now to support that view. Some yards have been unable to deplete their yard stocks to avoid higher city and county property taxes, even though they offer to cut prices $1 a ton.

● **Cincinnati**—Traders think prices are on bottom. No. 1 heavy melting is unchanged at $22.50-$23.50, based upon a local mill's purchase of limited tonnage for December shipment. Brokers report growing price resistance on the part of dealers.

● **St. Louis**—The market is now thought to be bumping bottom.

(*Please turn to Page* 171)



Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Dec. 14, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 14	$28.67
Dec. 7	28.67
Nov. Avg.	28.83
Dec. 1959	41.71
Dec. 1955	50.37

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 dealer bundles	27.00-28.00
No. 2 bundles	20.00-21.00
No. 1 busheling	26.00-27.00
No. 1 factory bundles	31.00-32.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	11.00-12.00
Short turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut structurals:	
2 ft and under	31.00-32.00
3 ft and under	30.00-31.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	34.00-35.00
Electric furnace bundles	32.00-33.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	31.00-32.00
Stove plate	27.00-28.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	31.00-32.00
Drop broken machinery	*44.00-45.00*§

Railroad Scrap

No. 1 R.R. heavy melt.	*29.00-30.00*
Rails, 2 ft and under	48.00-49.00
Rails, 18 in. and under	49.00-50.00
Random rails	*41.00-42.00*
Angles, splice bars	*37.00-38.00*
Railroad specialties	*39.00-40.00*
Rails, rerolling	*53.00-54.00*

Stainless Steel Scrap

18-8 bundles & solids	175.00-180.00
18-8 turnings	95.00-100.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	26.00-27.00
No. 1 hvy melt., dealer	24.00-25.00
No. 2 hvy melting	22.00-23.00
No. 1 factory bundles	29.00-30.00
No. 1 dealer bundles	25.00-26.00
No. 2 bundles	16.00-17.00
No. 1 busheling, indus.	26.00-27.00
No. 1 busheling, dealer	24.00-25.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	13.00-14.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Cut structurals, 3 ft	30.00-31.00
Punchings & plate scrap	32.00-33.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Stove plate	30.00-31.00
Unstripped motor blocks	28.00-29.00
Clean auto cast	41.00-42.00
Drop broken machinery	41.00-42.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
R.R. malleable	40.00-41.00
Rails, 2 ft and under	42.00-43.00
Rails, 18 in. and under	43.00-44.00
Angles, splice bars	37.00-38.00
Axles	48.00-49.00
Rails, rerolling	46.00-47.00

Stainless Steel Scrap

18-8 bundles, solids	160.00-165.00
18-8 turnings	90.00-95.00
430 bundles & solids	75.00-80.00
430 turnings	40.00-45.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	17.00-18.00
No. 2 heavy melting	13.00-14.00
No. 1 bundles	19.00-20.00
No. 2 bundles	10.00-11.00
No. 1 busheling	16.00-17.00
Machine shop turnings	5.00-6.00
Mixed borings, turnings	5.00-6.00
Shovel turnings	6.00-7.00

Cast Iron Grades

No. 1 cupola	28.00-29.00
Stove plate	22.00-23.00
Heavy breakable	21.00-22.00
Unstripped motor blocks	17.00-18.00
Charging box cast	23.00-24.00
Clean auto cast	34.00-35.00

CLEVELAND

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00†
No. 1 factory bundles	27.00-28.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Machine shop turnings	10.00-11.00
Shovel turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Cast iron borings	14.00-15.00
Cut foundry steel	28.00-29.00
Cut structurals, plate 2 ft and under	31.00-32.00
Low phos. punchings & plate	26.00-27.00
Alloy free, short shovel turnings	14.00-15.00
Electric furnace bundles	24.00-25.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	24.00-25.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	28.00-29.00
Brake shoes	35.00-36.00
Clean auto cast	42.00-43.00
Burnt cast	30.00-31.00
Drop broken machinery	42.00-43.00

Railroad Scrap

R.R. malleable	42.00-43.00
Rails, 2 ft and under	45.00-46.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	38.00-39.00
Cast steel	32.00-33.00
No. 1 railroad cast	42.00-43.00
Railroad specialties	37.00-38.00
Angles, splice bars	36.00-37.00
Rails, rerolling	51.00-52.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	150.00-155.00
18-8 turnings	65.00-70.00
430 clips, bundles, solids	65.00-70.00
430 turnings	10.00-20.00

YOUNGSTOWN

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	21.00-22.00
No. 1 busheling	26.00-27.00
No. 1 bundles	26.00-27.00
No. 2 bundles	20.00-21.00
Machine shop turnings	12.00-13.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	27.00-28.00
Electric furnace bundles	27.00-28.00

Railroad Scrap

No. 1 R.R. heavy melt.	29.50-30.50

BUFFALO

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 2 bundles	16.00-17.00
No. 1 busheling	23.00-24.00
Shovel turnings	13.00-14.00
Machine shop turnings	9.00-10.00
Cast iron borings	11.00-12.00
Low phos. structurals and plates, 2 ft and under	33.00-34.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	36.00-37.00
No. 1 machinery	43.00-44.00

Railroad Scrap

Rails, random lengths	36.00-37.00
Rails, 3 ft and under	42.00-43.00
Railroad specialties	35.00-36.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	22.50-23.50
No. 2 heavy melting	19.50-20.50
No. 1 bundles	23.50-24.50
No. 2 bundles	15.00-16.00
No. 1 busheling	22.50-23.50
Machine shop turnings	8.00-9.00
Mixed borings, turnings	8.00-9.00
Shovel turnings	10.00-11.00
Cast iron borings	10.00-11.00
Low phos. 18 in.	31.00-32.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	28.00-29.00
Charging box cast	34.00-35.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00-29.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	36.00-37.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	29.00
No. 1 bundles	35.00
No. 2 bundles	20.00
No. 1 busheling	35.00
Electric furnace bundles	36.00
Mixed borings, turnings	14.00†
Shovel turnings	18.00
Machine shop turnings	13.00
Heavy turnings	25.00†
Structurals & plates	37.00-39.00
Couplers, springs, wheels	37.00
Rail crops, 2 ft & under	47.00-49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	37.00
Drop broken machinery	47.00-48.00
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	18.00-19.00
No. 1 bundles	27.00-28.00
No. 2 bundles	13.00-14.00
Machine shop turnings	*3.50-4.00†*
Mixed borings, turnings	*4.00-4.50†*
Shovel turnings	*5.00-6.00†*
Low phos. structurals & plates	31.00-32.00†

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	28.00-29.00

Stainless Steel

18-8 sheets, clips, solids	*140.00-145.00†*
18-8 borings, turnings	70.00-75.00†
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	50.00-55.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 1 busheling	23.00-24.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	28.00-29.00
No. 2 bundles	20.00-21.00
No. 1 busheling	29.00-30.00
Cast iron borings	10.00-11.00
Machine shop turnings	15.00-16.00
Shovel turnings	18.00-19.00
Bar crops and plate	*35.00-36.00†*
Structurals & plate	*35.00-36.00†*
Electric furnace bundles	*30.00-31.00†*
Electric furnace:	
3 ft and under	31.00-32.00
2 ft and under	33.00-34.00

Cast Iron Grades

No. 1 cupola	*41.00-42.00†*
Stove plate	*41.00-42.00†*
Unstripped motor blocks	*30.00-31.00†*
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
Rails, 18 in. and under	44.00-45.00
Rails, random lengths	38.00-39.00
Angles, splice bars	37.00-38.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	27.00
No. 2 heavy melting	25.00
No. 1 bundles	28.00
No. 2 bundles	18.00
No. 1 busheling	28.00
Machine shop turnings	7.00
Shovel turnings	9.00

Cast Iron Grades

No. 1 cupola	36.00
Charging box cast	33.00
Heavy breakable cast	31.00
Unstripped motor blocks	33.00
Clean auto cast	39.00
Stove plate	34.00

Railroad Scrap

No. 1 R.R. heavy melt.	28.00
Rails, random lengths	*35.00*
Rails, rerolling	44.00
Rails, 18 in. and under	38.00
Angles, splice bars	32.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	29.00
No. 1 bundles	31.00-32.00
No. 2 bundles	18.00-19.00
Machine shop turnings	7.00-8.00†
Low phos. plate & structurals:	
3 ft	34.00
2 ft and under	36.00-37.00

Cast Iron Grades

No. 1 cupola	34.00-34.50
Heavy breakable	25.00
Foundry malleable	29.00-30.00†
Unstripped motor blocks	28.00-28.50

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00

LOS ANGELES

No. 1 heavy melting	*34.00**
No. 2 heavy melting	*30.00**
No. 1 bundles	28.00†
No. 2 bundles	*23.00**
Machine shop turnings	12.00†
Shovel turnings	14.00†
Cast iron borings	12.00†
Cut structurals and plate 1 ft and under	41.00†

Cast Iron Grades

No. 1 cupola	*35.00*

Railroad Scrap

No. 1 R.R. heavy melt.	40.00†

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00
No. 2 heavy melting	34.00
No. 2 bundles	19.00
Shovel turnings	13.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	31.50
Heavy breakable	31.00
Unstripped motor blocks	31.00
Stove plate (f.o.b. plant)	18.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	36.00
No. 1 (prepared for shears)	33.00
No. 1 hvy (unprepared)	33.00
No. 2 heavy melting	34.00
No. 2 hvy (unprepared)	30.00
No. 2 (prepared for shears)	28.00
No. 2 bundles	20.00
Shovel turnings	15.00
Electric furnace bundles	46.00

Cast Iron Grades

No. 1 cupola	31.50
Heavy breakable cast	33.00
Unstripped motor blocks	30.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	32.00
No. 2 heavy melting	29.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

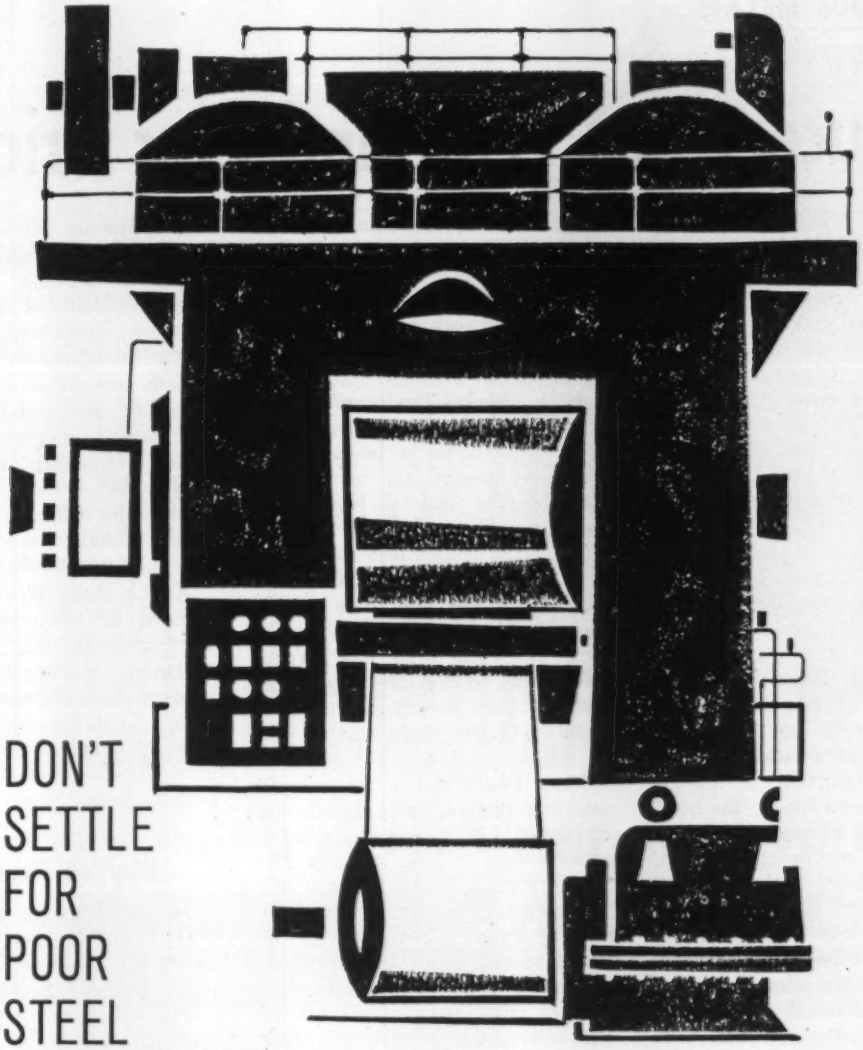
(Brokers' buying prices; net tons)

No. 1 heavy melting	*24.00*
No. 2 hvy melt, 2 ft & under	*22.50*
No. 1 bundles	*24.00*
No. 2 bundles	*17.00*
Mixed steel scrap	16.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	*23.00*
Unprepared	*18.00*
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	*30.00*

*For export add $4 dock charges.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.



DON'T
SETTLE
FOR
POOR
STEEL
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LOOK TO LURIA

FOR DEPENDABLY ANALYZED AND SEGREGATED
STAINLESS AND ALLOY STEEL SCRAP . . . . .

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FOREIGN TRADE — LURIA INTERNATIONAL, INC., CHRYSLER BUILDING EAST, NEW YORK, N. Y. • 5950 S. BOYLE AVE., LOS ANGELES 58, CAL. • *Cable Address:* FORENTRACO

Producers Cut Lead and Zinc Prices

Nonferrous Metal Prices, Pages 170 & 175

IN A PREHOLIDAY present to users, lead and zinc producers slashed prices last week, ending a year of unusual price stability.

Zinc dropped 0.5 cent to 12.5 cents a pound. Lead came down a full cent to 11 cents a pound. It was the first change in the zinc price since Jan. 8 and the first for lead since Dec. 21, 1959. The lead quotation is now the lowest in 20 months.

The zinc diecast alloys were cut by 0.75 cent a pound, reflecting the weakening condition of that market in recent weeks.

• **Not If, But When**—It wasn't the spirit of Christmas that prompted the price drop but rather the harsh realities of a lackluster market where production is topping demand. In recent weeks, the question has been more one of how long the two metals could maintain price stability rather than if they would.

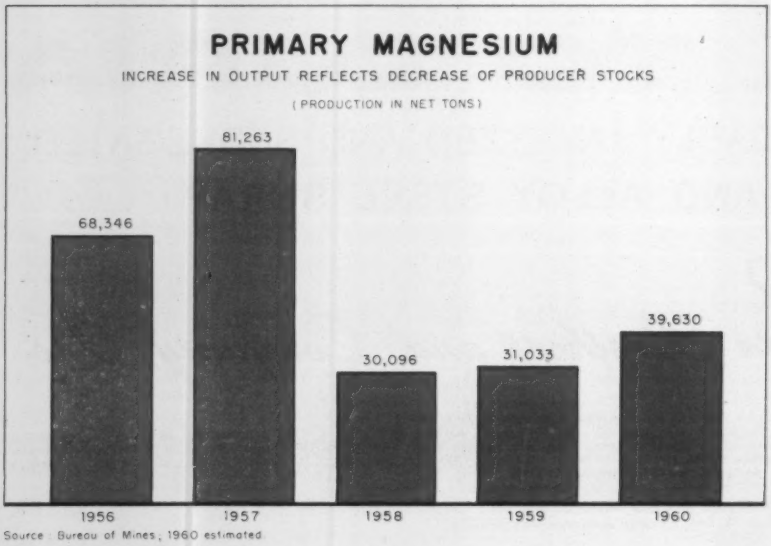
Sales have been slow and the prospects aren't bright for the next few months. The slump in steel has hurt zinc demand. So has the popularity of the compact auto which uses only about half as much zinc as the bigger cars. Lead's major markets have been off most of the year. The year-long tendency of users to work off their inventories has made matters worse.

• **High Stocks**—Producers' stocks are too high. U. S. slab zinc stocks have come down a bit over the last few months but at 190,288 tons (at the end of November) they are still too high, say metalmen. U. S. refined lead stocks this year increased by 19,000 tons through October and those outside this country by more than 54,000 tons, increasing total Free World lead stocks to 366,090 tons. Forecasts indicate inventories of both metals will rise again this month.

• **More Production** — To complicate the picture, more metal will be on the U. S. market soon, thanks to settlement of labor troubles that kept a portion of the industry idle last spring. New Jersey Zinc Co. recently signed a contract with the union to end a four month walkout at its mines and smelters. Bunker Hill Co., deadlocked with the International Union of Mine, Mill & Smelter Workers since May, will probably be back in operation soon, thanks to a recent worker vote disfranchising Mine-Mill and granting bargaining rights to a newly formed local.

Both companies are major producers of zinc, and Bunker Hill is the second biggest U. S. lead miner. Metalmen felt this added production could only further weaken the market. In fact, prices would probably have fallen before now if it hadn't been for the strikes.

All of those factors have contributed to recent falling quotations overseas and weakness here at home. Various forms of price shading have become quite common. That has been particularly true in some of the zinc diecast grades where competition is especially keen.



Source: Bureau of Mines; 1960 estimated

Why '60 Went Sour?

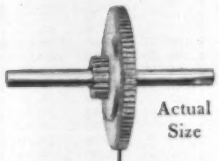
The weakness in lead and zinc is typical of the disappointing year for most nonferrous metals. What went wrong?

The answer is simple: The economy just never lived up to the early bullish expectations. Demand slumped and consumption fell even more as customers pared inventory to the working minimum. Production ran at too high a level for demand, with the inevitable result that producers' stocks rose. With no supply worries, customers have been content to sit back and order tomorrow's metal today.

A Spur to Legislation?

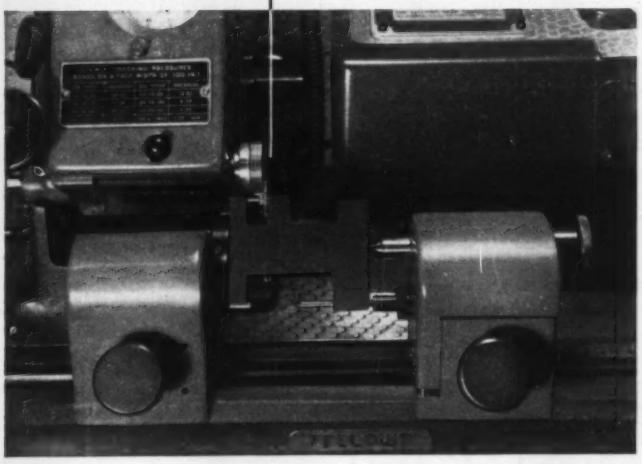
Slack sales and price weakness, particularly in lead and zinc, will add more fuel to the arguments for metals legislation. Already mine state congressmen are warming up "old bills" for early submission to the new Congress. Partisans feel incoming Interior Secretary Stewart Udall will give them a sympathetic hearing.

now you can check
and record fine-
pitch gear accuracy



at 1600 magnifications

on the No. 4 Fellows Red Liner



Now, the No. 4 Red Liner makes "composite" checks on the finest instrument gears with unbelievable accuracy and sensitivity. 1600 to 1 magnifications are obtained with the electrical recording system which gives a written, unbiased record for instant reading or for proof-of-accuracy files.

One report states — "11 teeth, 200 D. P. pinion backed up to a 100 tooth gear on a cluster, checked easily on the No. 4 Red Liner."

The job shown is 96 pitch with 22 teeth on the small gear and 80 teeth on the larger gear. The pinion shaft rides in vees in a turret-type fixture.

Fellows inspection units cover a range from the tiniest instrument gear up to some that are 24 inches in diameter.

THE FELLOWS GEAR SHAPER COMPANY 78 River Street, Springfield, Vermont, U.S.A.

Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N.J.
5835 West North Avenue, Chicago 39
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THE PRECISION LINE

Fellows

Gear Production Equipment

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 26.25-26.75, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment data, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.
Copper: Electrolytic, 30.00 deld.; custom smelters, 30.00; lake, 30.00 deld.; fire refined, 29.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90, St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-99 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $208-210 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.
Ruthenium: $45-50 per troy oz.
Selenium: $6.50-7 per lb, commercial grade.
Silver: Open market, 91.375 per troy oz.
Sodium: Solid pack, c.l., 1950; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.
Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.
Tellurium: $3.50-5 per lb, 100 lb or more.
Thallium: $7.50 per lb.
Tin: Straits, N. Y., spot, 101.875; prompt, 101.375.
Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.
Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.
Zinc: Prime western, 12.50; brass special, 12.75; intermediate, 12.50, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 13.85; special high grade, 14.00 deld. Diecasting alloy ingot No. 3, 15.50; No. 2, 16.00; No. 5, 15.75 deld.
Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb, 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.
(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.00.

Brass Ingot: Red brass, No. 115, 28.25; tin bronze, No. 225, 38.00; No. 245, 32.50; high-leaded tin bronze, No. 305, 32.75; No. 1 yellow, No. 405, 23.50; manganese bronze, No. 421, 27.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.945, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.945, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 35.35; l.c.l., 35.98. Weatherproof, 20,000-lb lots, 36.30; l.c.l., 37.05.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths: .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-106.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.25-24.75; No. 2 heavy copper and wire, 22.50-23.00; light copper, 19.50-20.00; No. 1 composition red brass, 20.00-20.50; No. 1 com-

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	55.13b	52.36c	....	56.32
Yellow Brass	49.27	34.88d	49.56	53.43
Low Brass, 80%	51.75	51.69	52.04	55.81
Red Brass, 85%	52.62	52.56	52.91	56.68
Com. Bronze, 90%	54.03	53.97	54.32	57.84
Manganese Bronze	57.77-57.82	51.42-51.46	61.69	....
Muntz Metal	52.14	47.45	....	....
Naval Brass	54.08	47.89	60.39	58.24
Silicon Bronze	60.45-60.48	59.64-59.67	59.74-59.77	78.89
Nickel Silver, 10%	64.68	67.01	66.76	....
Phos. Bronze, A-5%	75.70	76.20	75.45	77.63

SCRAP ALLOWANCES e (Based on copper at 30.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper	26.000	26.000	25.250
Yellow Brass	20.375	19.625	18.625
Low Brass, 80%	22.500	22.250	21.750
Red Brass, 85%	23.250	23.000	22.500
Com. Bronze, 90%	24.000	23.750	23.250
Manganese Bronze	19.250	19.000	18.375
Muntz Metal	19.475	19.125	18.625
Naval Brass	19.125	18.875	18.375
Silicon Bronze	25.500	25.250	24.500
Nickel Silver, 10%	25.125	24.875	12.562
Phos. Bronze, A-5%	27.125	26.875	25.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents pe rlb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

position turnings, 19.00-19.50; new brass clippings, 16.50-17.00; light brass, 13.50-14.00; heavy yellow brass, 14.50-15.00; new brass rod ends, 15.50-16.00; auto radiators, unsweated, 15.75-16.25; cocks and faucets, 16.50-17.00; brass pipe, 17.50-18.00.

Lead: Soft scrap lead, 7.75-8.00; battery plates, 3.00; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 23.00-24.00; old sheets 22.00-23.00; turnings, 16.50-17.50; rods, 22.00-23.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 3.00-3.50; new diecast scrap, 4.25-4.50; old diecast scrap, 2.75-3.00.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 6.00-6.50; segregated low copper clips, 13.00-13.50; segregated high copper clips, 12.00-12.50; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.00-10.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 13.00-13.50; segregated high copper clips, 13.50-14.00; mixed low copper clips, 12.50-13.00; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.00; clean borings and turnings, 8.50; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.
Copper and Brass: No. 1 heavy copper and wire, 24.50; No. 2 heavy copper and wire, 23.75; light copper, 21.75; refinery brass (60% copper) dry copper content, 22.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.50; No. 2 heavy copper and wire, 23.75; light copper, 21.75; No. 1 composition borings, 21.00; No. 1 composition solids, 21.50; heavy yellow brass solids, 16.00-16.25; yellow brass turnings, 15.00-15.25; radiators, 17.00-17.25.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.04; oval, 43.50, 5000-10,000 lb; electrodeposited, 39.00, 2000-5000 lb lots; cast, 41.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 120.50; 200-499 lb, 119.00; 500-999 lb, 118.50; 1000 lb or more, 118.00.

Zinc: Balls, 20.00; flat tops, 20.00; flats, 23.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.25; 2000-5900 lb, 13.25; 6000-11,900 lb, 13.00; 12,000-22,900 lb, 12.75; 23,000 lb or more, 12.25.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 79.50; 100-600 lb, 70.20; 700-1900 lb, 67.40; 2000-9900 lb, 65.60; 10,000 lb or more, 64.20.

Stannous Chloride (Anhydrous): 25 lb, 155.00; 100 lb, 150.10; 400 lb, 147.70; 800-19,900 lb, 106.80; 20,000 lb or more, 100.70.

Stannous Sulphate: Less than 50 lb, 140.20; 50 lb, 1[illegible].20; 100-1900 lb, 108.20; 2000 lb or more, [illegible].20.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, [illegible].

(*Concluded from Page* 165)

Prices are holding, but are no longer nominal since sufficient material has moved the last week to make a market. Dealers are expecting better prices next quarter.

• **Birmingham** — The market remains dull. Prices are generally off $1 to $4 a ton, but they are largely nominal. Structurals and plates are down $1 to $35-$36. No. 1 cupola and stove plate are off $4 a ton to $41-$42. Unstripped motor blocks are quoted off $2 to $30-$31. Running counter to the trend are electric furnace bundles, up $2 to $30-$31, reflecting competition outside the immediate area market.

• **Houston**—Little trading is reported in the domestic market. Prices are holding, largely because they're untested. Substantial tonnage is reported moving for export, with quotations at Beaumont and Baton Rouge running up to $35, delivered, for No. 1 heavy melting steel, and $31 for No. 2.

• **San Francisco**—A somewhat increased tempo of exports has lent a tightening influence to the steel scrap market. However, the mills are not buying, offsetting any pressure for a general markup in quotations.

• **Los Angeles**—Dealers are anticipating heavy shipments to Japan. It's expected that West Coast ports will handle 30 of the 95 cargoes negotiated for the first quarter of next year. Local mills are taking about 10,000 tons monthly. Prices are soft.

• **Seattle**—Activity is limited, with domestic consumers well stocked and exporters holding off stockpiling until after the end of the year because of tax considerations. Better demand is expected next month. Considerable export activity is expected early next year as a result of larger commitments on Japanese account. Settlement of a labor dispute that tied up operation of a dock crane for 60 days brightens the local market outlook.

Rails, Cars . . .

Track Material Prices, Page 156

Pullman-Standard Div., Pullman Inc., has received an order for 750 boxcars from the Chicago, Milwaukee, St. Paul & Pacific Railroad. The cars will be built at the company's Michigan City, Ind., plant which only a week or so ago was placed on a standby basis because of lack of orders.

Pullman hopes to recall some of the 900 furloughed employees by mid-January when construction of the cars will start. Of the total order, 650 units will be 40 ft long and of 50 ton capacity, while 100 will be 50 ft long, and 70 ton capacity.

Iron Ore Imports Rise in First Ten Months of '60

Imports of iron ore in the January-September period totaled 28,472,954 long tons (valued at $264,984,129), reports the U. S. Bureau of Mines. In the same period last year, the total was 24,879,435 tons (valued at $215,864,296).

The largest source was Venezuela —11,595,491 tons valued at $105,325,363. That country also led last year with 9,722, 891 tons, valued at $74,458,599. Breakdown by source of imports:

Iron Ore Imports—January-September
(Gross tons)

Country	1960	1959
Brazil	1,143,713	885,718
British W. Africa	35,180	38,101
Canada	9,174,550	9,267,270
Chile	3,055,749	2,643,478
Cuba	2,820	1,600
Denmark	468	358
Iran	1,968	2,756
Dominican Republic	.....	50,370
Western Africa	5,672	.....
Liberia	711,291	804,326
Mexico	127,783	77,378
Peru	2,493,740	1,267,183
Philippines	1,000	53,998
Portuguese Asia	56,900	.....
Spain	180	209
Sweden	66,301	42,025
United Kingdom	148	18,964
Venezuela	11,595,491	9,722,891
Surinam	.....	2,320
Total	28,472,954	24,879,435

CLASSIFIED

Positions Wanted

BLOOMING MILL FOREMAN—Experienced in carbon, alloy, stainless steels and titanium. Reply Box 891, STEEL, Penton Bldg., Cleveland 13, Ohio.

WE CAN HELP YOU TO CONTACT high calibre men to fill specific jobs you have in mind.

Readers of STEEL include men of wide training and experience in the various branches of the metalworking industry. When you have an opportunity to offer, use the Help Wanted columns of STEEL.

More equipment manufacturers choose Fast's Couplings than any other gear-type coupling

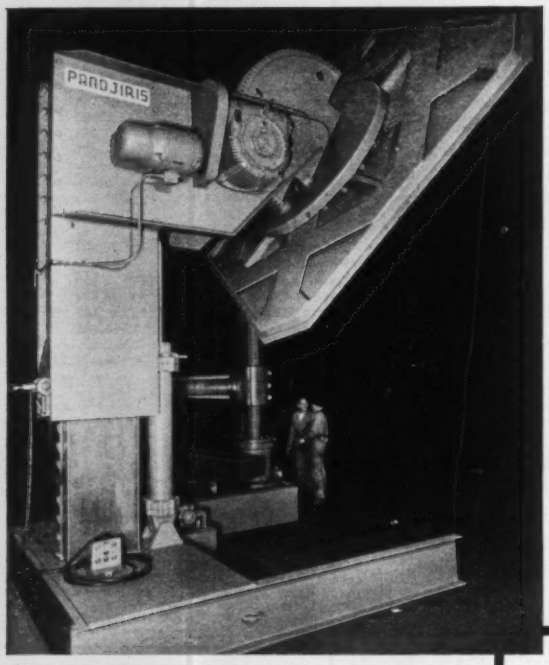
Leaving other claims aside, the thing that counts in couplings is customer confidence—and industrial equipment manufacturers have made Fast's their overwhelming choice. The Fast's line is more diversified, too—in a complete range of sizes and types for shafts, from ½" to 32" and larger.

Every Fast's Coupling brings you superb engineering only the original gear-type coupling can deliver. Smooth-running units that are designed to outlast the machines they connect. Rapid service from experienced field engineers backed by outstanding stock facilities. Write today for full details on couplings to suit your needs to: KOPPERS COMPANY, INC., Fast's Coupling Dept., 312 Scott St., Baltimore 3, Maryland.

KOPPERS

FAST'S COUPLINGS

Engineered Products Sold with Service



Put 20 tons where you want it

Position of the work is mighty important when welding. This 20-ton capacity positioner tilts, rotates and elevates automatically. Two standard Cone-Drive **double-enveloping worm** gear reducers provide the drive and tuck away compactly under the table.

Compact Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

(Concluded from Page 163)

432 tons, state bridgework, FIC 60-18, Schenectady County, New York; bids closed Dec. 9.

350 tons, state bridgework, Beaver Falls, Pa.; Frank Donatelli Inc., Pittsburgh, low on the general contract.

320 tons, state bridgework, Chester-Delaware counties, Pennsylvania; Glasgow Inc., is low on the general contract.

305 tons, state bridgework, RC 60-190, Wayne County, New York; bids closed Dec. 9.

250 tons, law building, University of Pennsylvania, Philadelphia; bids Dec. 21.

200 tons, leg extensions, etc., 345 kv, Schedule V1, transmission line, Washington State; involving 75 steel towers, government furnished; Tyee Construction Co., Mercer Island, Wash., low at $248,861 to Bonneville Power Administration, Portland, Oreg.

114 tons, state bridgework, RC 60-176, Sullivan County, New York; bids closed Dec. 9.

REINFORCING BARS . . .

REINFORCING BARS PLACED

160 tons, two state highway bridges, Manchester, N H., to Bancroft & Martin Rolling Mills Co., South Portland, Maine; Louis Scheyd, Hopkinton, N. H., contractor; structural steel to Lyons Iron Works, Manchester, N. H., and 160 tons, steel piling, to H. B. Flemming Inc., Boston.

160 tons, pumphouse, etc., Bureau of Reclamation project, near Wenatchee, Wash., to Joseph T. Ryerson & Son Inc., Seattle.

125 tons, sewage treatment plant, Bellingham, Wash., to Pacific Coast Div., Bethlehem Steel Co., Seattle; G. R. Leischner Construction Co., Seattle, general contractor.

REINFORCING BARS PENDING

20,000 tons, ballistic missile complex, Great Falls, Mont.; bids in Dec. 13, to U. S. Engineer, Seattle.

800 tons or more, city hall, Seattle; Patti-MacDonald Construction Co. and Mibur Inc., Seattle, joint low bid $4,856,878.

50 tons, also steel gates, etc., Idaho, St. Maries River bridge; bids to Boise, Dec. 27.

PLATES . . .

PLATES PLACED

900 tons, 2.4 mile discharge pipe, Chief Joseph Dam project, East Wenatchee, Wash., to Beall Pipe & Tank Corp., Portland, Oreg.; Jensen, Rasmussen & Co., Sunnyside, Wash., and Beck Corp., Seattle, joint contract at $1,104,087 to the Bureau of Reclamation.

100 tons, 250,000 gallon elevated tank, Indian school, Wanblee, S. Dak., to Pittsburgh-Des-Moines Steel Co., Pittsburgh.

PLATES PENDING

900 tons, 3 million gallon water tank; Chicago Bridge & Iron Co., Seattle, is low at $450,850 to the city of Portland, Oreg.

100 tons, 10,000 barrel storage tank, Geiger Air Field, Spokane, Wash.; bid called Dec. 8 canceled.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Ferrocarril Chihuahua Al Pacifico, Mexico, nine, 1600 hp, all purpose diesels and one, 1200 hp switcher to Fairbanks Morse & Co., Chicago.

RAILROAD CARS PLACED

Chicago, Milwaukee, St. Paul & Pacific, 750 boxcars to Pullman-Standard Div., Pullman Inc., Chicago.

Western Pacific, 50, seventy ton flatcars to the Thrall Car Mfg. Co., Chicago Heights, Ill.

North American Car Corp., 35, covered hopper cars to the Thrall Car Mfg. Co., Chicago Heights, Ill., for leasing to United Carbon Co., Houston.

Northern Pacific, 5, seventy ton, covered hopper cars to General American Transportation Co., Chicago.

Detroit, Toledo & Ironton, 100, fifty ton boxcars, to Pullman-Standard Div., Pullman Inc., Chicago.

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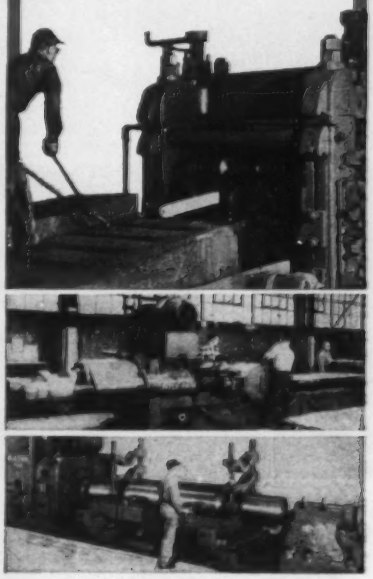
ROLLING MILL EQUIPMENT



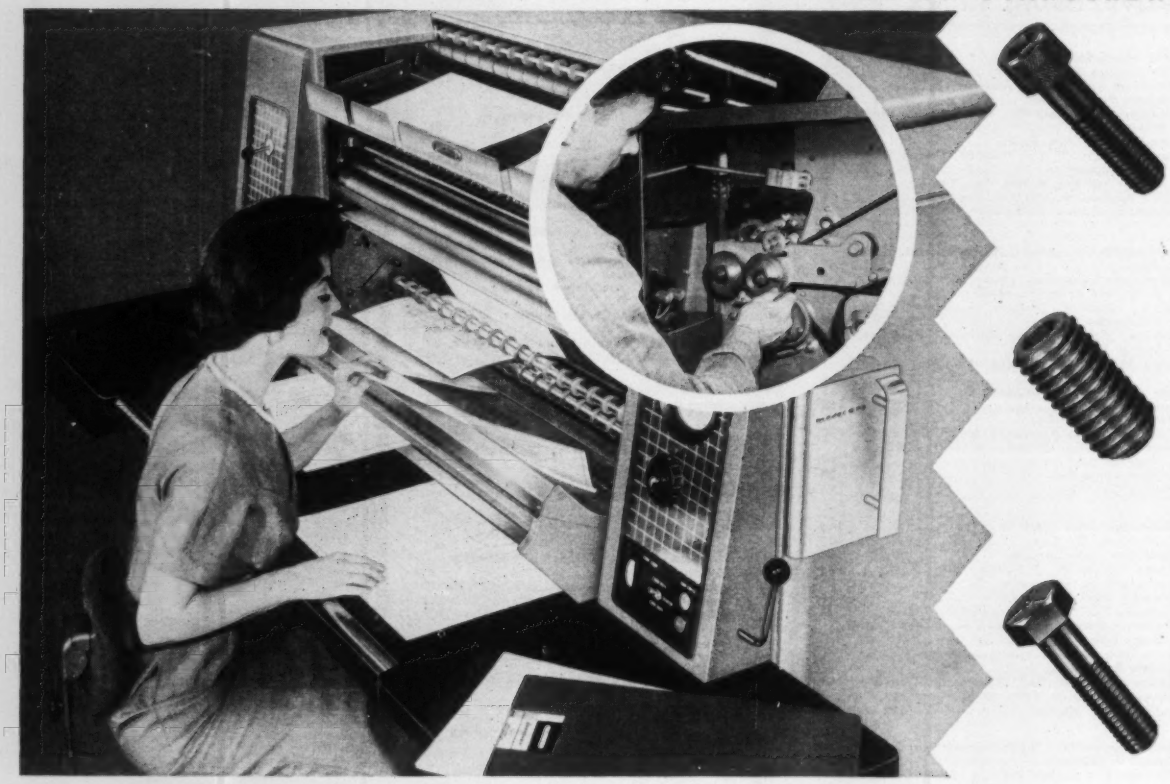
Hyde Park Engineers are always ready to co-operate with you in selecting and applying the rolling mill equipment best suited to your operation.

Bar Mills • Merchant Mills
Sheet and Strip Mills
Stretcher Levellers
Roller Tables • Pinion Stands
Sheet Mill Shears
Roll Lathes • Reduction Drives
Special Machinery • Machine Work

Hyde Park
FOUNDRY AND MACHINE CO.
HYDE PARK
Westmoreland County, Penna.

Rolls
Rolling Mill Equipment
Gray Iron Castings

IT PAYS TO STANDARDIZE ON **STANSCREW**



Stanscrew suggests... BRUNING verifies... Socket set screws solve *Copyflex* problem

Charles Bruning, Inc., manufacturers of the widely accepted Copyflex, recently found that the fasteners they were using to attach the unit's sprockets and gears did not meet the rigid performance standards they set up for all component parts.

Bruning's distributor arranged a visit from a Stanscrew specialist, who recommended Stanscrew's regular socket set screws. Bruning verified their operational efficiency with exhaustive laboratory and engineering tests . . . made the conversion . . . and eliminated the loosening problem (plus eliminating many service calls).

Now, 100 Stanscrew fasteners are specified for each Model 675 Copyflex. In addition to socket set screws, they include socket head, hex head, and fillister head cap screws which are used in a wide variety of critical applications.

Like Bruning, more and more industrial leaders are learning it pays to standardize on Stanscrew. Their more than 5,500 different standard fasteners provide economical answers to the overwhelming majority of all industrial requirements . . . and are produced to consistent quality standards which eliminate production problems and lower assembly costs.

The Stanscrew fastener specialist may be able to help you cut fastener costs. Your Stanscrew distributor will be happy to arrange a prompt visit. Call him today.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

The Pangborn Vibratory Finishing Machine

THE LONGER YOU OWN IT, THE MORE USEFUL IT IS!

"Every day we find new pieces it can finish," comes the word from the large, Midwestern die-casting firm shown above. And no wonder!

This machine makes itself useful in many ways: cleaning, descaling, radiusing, fine-finishing, burnishing or coloring. It can do all this with metals, alloys, many types of plastic and ceramic parts . . . and at speeds up to 100 times faster than conventional methods. It cleans the intricate or shielded surfaces you can't reach with barrel finishing or other means.

Available in many sizes, the Pangborn Vibratory Finishing Machine is the most compact unit in its field. Its standard equipment includes variable speeds and exclusive air-conditioned suspension which assures automatic leveling and amplitude control. Auxiliary equipment, media and compounds available for every need.

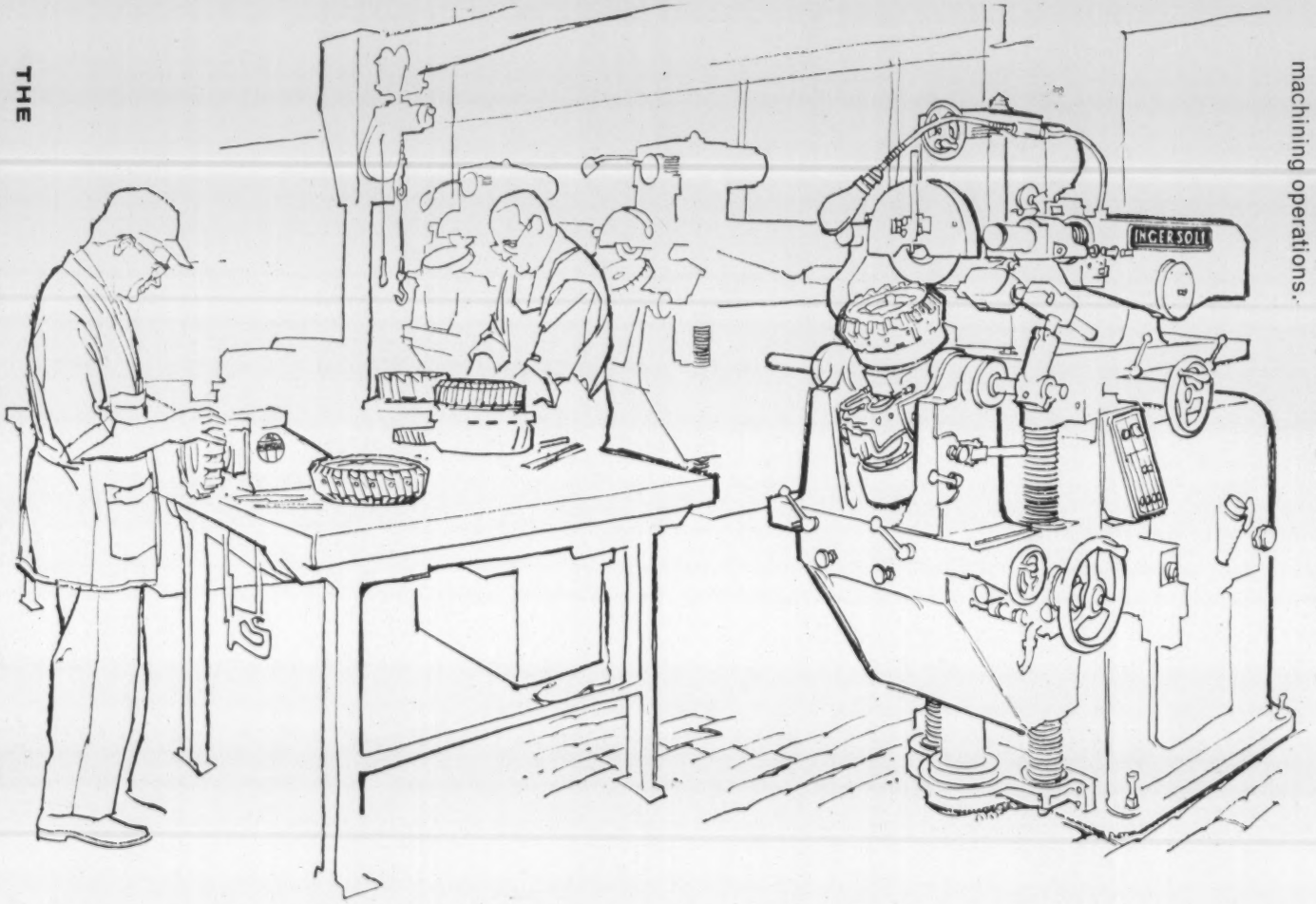
Send parts with exact finish specifications or finished specimen, for sample processing in our laboratory to: Mr. William E. Brandt, PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control, Blast Cleaning and Vibratory Finishing Equipment—Rotoblast® Steel Shot and Grit.®*

Pangborn

OF HAGERSTOWN

NEW FROM INGERSOLL...

This is one of a number of NEW INGERSOLL MACHINES which have been developed for customers who are determined to increase profits by reducing costs and improving machining operations.



A NEW AUTOMATIC CUTTER GRINDER: Cam control of the grinding action makes it possible to control and repeat correct grinds indefinitely, thereby reducing production losses which result when cutters are poorly or inconsistently ground. One man can operate three of these new Ingersoll grinders, which are heavy, precision machines, kept maintenance-free by complete dust protection of moving parts. Using the machine itself to cut its own cams, the operator takes only a short time to produce a cam and completely set up the machine for grinding a new cutter.

THE **INGERSOLL**
MILLING MACHINE COMPANY
ROCKFORD, ILLINOIS